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Coal Mine Injury and Employment Experience by Occupation, 1976–1980

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COAL MINE INJURY AND EMPLOYMENT EXPERIENCE BY OCCUPATION 1976-80

by

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COAL MINE INJURY AND EMPLOYMENT EXPERIENCE BY OCCUPATION, 1976-80

by

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ABSTRACT

This report presents the injury and employment experience, from 1976 through 1980, of selected occupations in the coal mining industry. Injury data from the MSHA Health and Safety Analysis Center's data base are matched with employment data for individual occupations collected through respirable dust sampling procedures, providing fatality and injury rates for each occupation. The rates are used to establish a ranking of occupations according to their level of risk.

INTRODUCTION

This report extends through 1980 a comparison of coal mine occupations with respect to their injury and employment experience from 1972 through 1975 presented in a previous report.[2/] The comparison may be used to rank coal mine occupations by their level of risk and in assigning priorities for enforcement, legislation, training, and technological development. In assigning these priorities, account must be taken not only for how dangerous a particular occupation is, but also how many workers are engaged in the occupation; the more workers involved, the more urgent is the need for special attention.

To establish that one occupation is more hazardous than another, a comparison is made between the rates at which injuries occur in those occupations (the number of injuries reported, compared to the number of employee-hours worked).

From 1930 through 1977, rates of injury occurrence in the U.S. mining industry were based on a common denominator of one million employee-hours of exposure and were known as "frequency rates." As of January 1, 1978, the system of reporting rates of occurrence was changed to conform to the U.S. Department of Labor's Bureau of Labor Statistics (BLS) method of compiling injury data in which the basic unit of measure is the "incidence rate," representing the number of occupational injuries per 200,000 employee-hours. The 200,000 employee-hours is equivalent to 100 persons working 40 hours per week for 50 weeks or about a year. By adopting the BLS definitions and classifications of occupational injuries and/or illnesses, injury rates prepared by MSHA after 1977 are directly comparable to those for other United States industries.

1/ Survey Statistician, Safety and Health Technology Center.

2/ Kogut, John, and Rhys G. Llewellyn, Coal Mine Injury and Employment Experience by Occupation, 1972-75. MSHA IR 1065, 1978, 30 pp.

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Another important change in 1978 involved injury-severity measures. Before 1978, nonfatal injuries were classified as either nonfatal disabling or nondisabling, a disabling injury being one that caused the miner to miss at least one shift of work. Under the current system reportable injuries are classified as fatal (F), nonfatal injuries with days lost (NFDL), or nonfatal injuries with no days lost (NDL). Under the previous reporting, if an injury merely resulted in restricted work activity, the case was not counted as a disabling injury; however, the NFDL category does include such injuries. Because of this difference, nonfatal injuries with days lost are not the same as disabling injuries. However, fatality rates, all injury rates, and rates of all nonfatal injuries can be converted accurately from the old system to the present one by dividing by five.

Because of the changes in reporting system, it has not been practical to combine 1978-80 data with data from previous years in this report, except as shown in figures 48 and 49, "Risk of fatal injury for selected coal occupations showing greatest employment, 1972-80" and "Risk of injury for selected coal occupations showing greatest employment, 1972-80." Figures 1-38, presented in the section titled "Injury and employment experience, 1976-80," are based, respectively, on the injury-frequency and injury-incidence rates as enumerated above. Figures 39-49, presented in the section titled "Rank of coal mine occupations according to risk," are based on an incidence of 200,000 employee-hours to assist the reader in making a comparison of the inherent risk of injury associated with each occupation over time.

Injury data for this report were obtained from mandatory injury reports sent by mine operators to MSHA's Health and Safey Analysis Center under the Federal Coal Mine Safety and Health Act of 1969 and the Federal Mine Safety and Health Act of 1977.

Employment data for individual occupations were obtained indirectly from respirable dust sampling procedures established under the Federal Coal Mine Health and Safety Act of 1969. The main limitation in using these procedures as a source of employment information is that they provide a record of the worker employment classification only on the date the worker was sampled. In the tabulation for this report, each worker was considered to have worked a full year in the occupation designated on the dust sample. If a worker was sampled more than once during a year, a full year of work was credited to the occupational category in which the worker was last classified. Each worker was credited with one full employee-year of exposure regardless of what fraction of the year the worker was actually employed.

Because injury reports and respirable dust reports are completed at different times and not always by the same person, discrepancies can arise in the occupational classification of a particular worker. "Helper" occupations may sometimes be abbreviated to the operator's classification, or a helper may sometimes be designated as an operator if operating equipment when injured or sampled. After a preliminary investigation showed that the employment estimated for "helper" occupations during the 1972-75 period was considerably lower than expected from functionally required ratios, it was decided that the data for each "helper" occupation should be combined with that of the corresponding "operator." It is recognized that the activities of the helper are quite different from those of operators, but the statistics are not reliable for the two classes taken individually.

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Other occupational categories were combined because of inconsistencies between classification schemes and because a number of different occupational titles were reported for essentially the same work. A complete list of occupational categories, showing which ones have been combined, is contained in appendix A. For reasons of statistical reliability, only individual or compound categories with more than 500 employees in one or more years during the period 1972-80 were included in the report.

Apart from the inconsistencies of classification, it should be kept in mind that the official occupational title of a worker--that is, the title set down on either an injury or respirable dust report--does not necessarily indicate the activity in which the worker was engaged at the time of a reported accident. It may not even indicate an activity which consumes a major portion of the worker's time. A worker nominally classified as an electrician, for example, may spend a great deal of time doing nonelectrical work, thereby being exposed to nonelectrical hazards. A distinction should, therefore, be drawn between designated occupations and occupational activities. Continuing the example, injury rates presented in this report apply not precisely to electrical activities, but to workers classified as electricians.

The first section of this report contains bar charts showing coal mine injury and employment experience, by year, for each of the years 1976-80 and for the periods 1976-77, 1972-77 and 1978-80. The second section contains a ranking of occupations according to risk.

INJURY AND EMPLOYMENT EXPERIENCE

Figures 1-16 and 31-38 depict the injury experience and employment for selected occupations in the coal mining industry, grouped into surface and underground. Graphs cover each of these groups during each of the years 1976-80, during the periods 1976-77, 1978-80, and during the 6-year period 1972-77. Additional graphs cover surface and underground supervisory and staff occupations separately in each of the 5 years and in 1976-77 and 1978-80.

Each graph consists of three bar charts depicting the fatality rate, nonfatal-injury rate, and employment for each specific occupation. It is important to note that the scales for fatality and nonfatal-injury rates are different in order to display the smaller differences among the fatality rates. The nonfatal-injury rate charts for years 1972 through 1977 also display the relative proportion of disabling to nondisabling injuries. The nonfatal-injury rate charts for 1978 through 1980 display the relative proportion of NFDL injuries (diagonal lines) and NDL (crosshatching). Data in parentheses represent the actual number of fatal or nonfatal injuries reported for each occupation.

The selected occupations in each category (surface, underground, supervisory, and staff) are arranged in descending order of employment for the period covered in each figure. In some instances, occupations have shifted relative positions over the years due to employment changes. As mentioned earlier, the study includes only occupations with at least 500 employees in at least one of the years 1972-80.

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Employment is presented in each graph to give the reader an indication of the prevalence of the particular occupation in the coal mining industry. Employment size is an important factor in determining the impact of the injury rate for a given occupation in the industry. For instance, over the period 1972-77 (figure 7), brakemen experienced the 2nd-highest fatality rate and the 5th-highest nonfatal-injury rate for the surface occupations listed, but the occupation ranked 14th in terms of employment. Thus, despite the high injury rate, fewer brakemen were injured than employees in other occupations with lower injury rates but higher employment.

Figures 1-8 provide employment and injury rate data for surface occupations. The fatality rates for 1976-77 provide a striking illustration of the difference between a high injury rate and a large number of injuries. Auger operators experienced the highest fatal-injury frequency rate for surface occupations during 1976-77 (figure 6). During this period two operators were killed, producing a frequency rate 3-1/2 times as high as for surface laborers, who experienced the greatest number of fatalities during the same period, 13 in all. During the 1972-77 period (figure 7), auger operators and helper ranked 19th in terms of employment, sustained five fatalities, and experienced a fatal-injury frequency rate of 0.99 per million employee-hours of exposure. Brakemen ranked second in fatality rate during 1972-77 with eight fatalities or 0.62 per million employee-hours of exposure, surface blaster third with five fatalities or 0.61 per million employee-hours.

During the 1978-80 period (figure 8), brakeman ranked 14th in terms of employment, sustained six fatalities, and experienced a fatal-injury-incidence rate of 0.17 per two hundred thousand employee-hours of exposure. Surface blasters ranked second in fatality rate during 1978-80, with four fatalities or 0.13 per two hundred thousand employee-hours of exposure; road grader operators third with two fatalities or 0.08 per two hundred thousand employee-hours.

Over the 2-year period 1976-77, the highest rate of nonfatal injuries among surface occupations occurred to mechanics and helpers, followed by shop welders and laborers. Over the same period, the highest rate of nonfatal disabling injuries in surface jobs occurred to surface laborers, followed by auger operators and helpers, mechanics and helpers, and shop welders.

Data for underground occupations are given in figures 9-16. During the 2-year period 1976-77, propmen, the 11th largest underground occupation in terms of employment, sustained 18 fatalities and experienced the highest fatal-injury rate (1.62 per million employee-hours for underground operations) (figure 14). Scoop car operators ranked 15th in terms of employment, sustained seven fatalities, and experienced the 2nd highest fatal-injury rate, 1.13 fatal injuries per million employee-hours. Underground laborers, the largest underground employment group, sustained a total of 27 fatalities during the same period, but experienced a fatal-injury frequency rate of 0.42 per million employee-hours, about 26 percent of that reported for propmen and 37 percent of that for scoop car operators. During the 1972-77 period (figure 15), scoop car operators ranked 20th in terms of employment, sustained 22 fatalities, and experienced the highest fatal-injury frequency rate of underground occupations studied, 1.74 million employee-hours of exposure. Loading machine operators and helpers ranked second in fatality rate during 1972-77 with 41 fatalities or 1.25 per million employee-hours of exposure, propmen third with 42 fatalities or 1.13 per million employee-hours.

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For the 2-year period 1976-77, roof bolters and helpers and propmen had the highest nonfatal injury rates, 130.51 and 126.95, respectively (figure 14). Underground laborers and scoop car operators experienced similar injury rates for the 2-year period (118.76 and 118.02), but for every scoop car operator injured, there were more than 10 laborers injured.

Figures 17-23 present data on surface supervisory and staff occupations. These experienced a higher fatal-injury rate and a somewhat lower nonfatal-injury rate during 1976-77 than did other surface occupations. Of the 29 surface occupations studied, four of the seven occupations with the highest fatality rates were supervisory and staff occupations (figures 6 and 22).

Figures 24-30 give similar data on underground supervisory and staff occupations. Two of the seven underground occupations with the highest fatal-injury frequency rates were supervisory and staff occupations (figures 14 and 29). However, underground supervisory and staff occupations ranked in the lower third of the list of nonfatal-injury frequency rates for underground occupations. Mine foreman or manager, superintendent, assistant mine foreman, outside foreman, and fire boss ranked 21st-24th and 26th, respectively, in nonfatal-injury frequency rates out of a list of 30 occupations; maintenance foreman, engineer, and mine clerk ranked 28th through 30th.

Figures 31 and 38 present data on supervisory and staff occupations. These occupations experienced a 17-percent increase from the nonfatal-injury frequency rate of 32.00 per million employee-hours reported in 1976, to 37.57 nonfatal injuries per million employee-hours in 1977. The 1978 nonfatal-injury incidence rate of 7.33 injuries per 200,000 employee-hours was equivalent to an injury-frequency rate of 36.66 per million employee-hours. The nonfatal-injury incidence rate per 200,000 employee-hours for supervisory and staff occupations during the 3-year period 1978-80 was 6.78, equivalent to 33.90 per million employee-hours. The nonfatal-injury frequency rate per million employee-hours for supervisory staff occupations during the 9-year period 1972-80 was 37.02, equivalent to 7.41 per 200,000 employee-hours.

Mine foremen and managers and preparation plant foremen experienced the highest fatal and nonfatal injury rates among supervisory and staff occupations during the 3-year period 1978-80. In 1978 three preparation plant foremen were killed, producing an incidence rate of 0.48, equivalent to a frequency rate of 2.40 injuries per million employee-hours. Although accounting for only 25 percent of the employment for supervisory and staff occupations studied, mine foremen and managers and preparation plant foremen accounted for 49 percent of the fatal injuries and 40 percent of the nonfatal injuries during the period 1978-80.

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FIGURE 1. – Injury-frequency rates and employment for coal surface occupations, 1976.

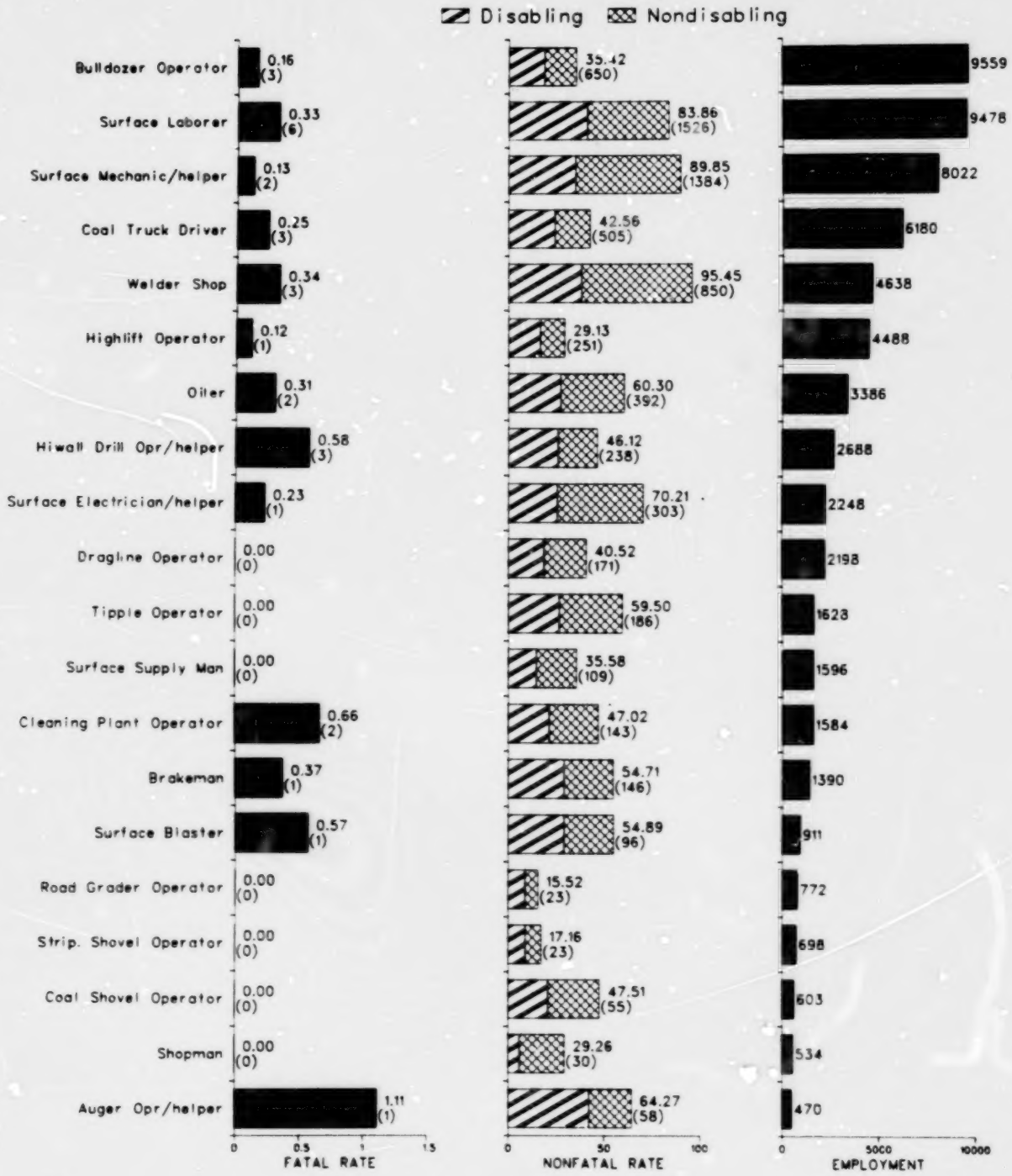

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FIGURE 2. - Injury-frequency rates and employment for coal surface occupations, 1977.

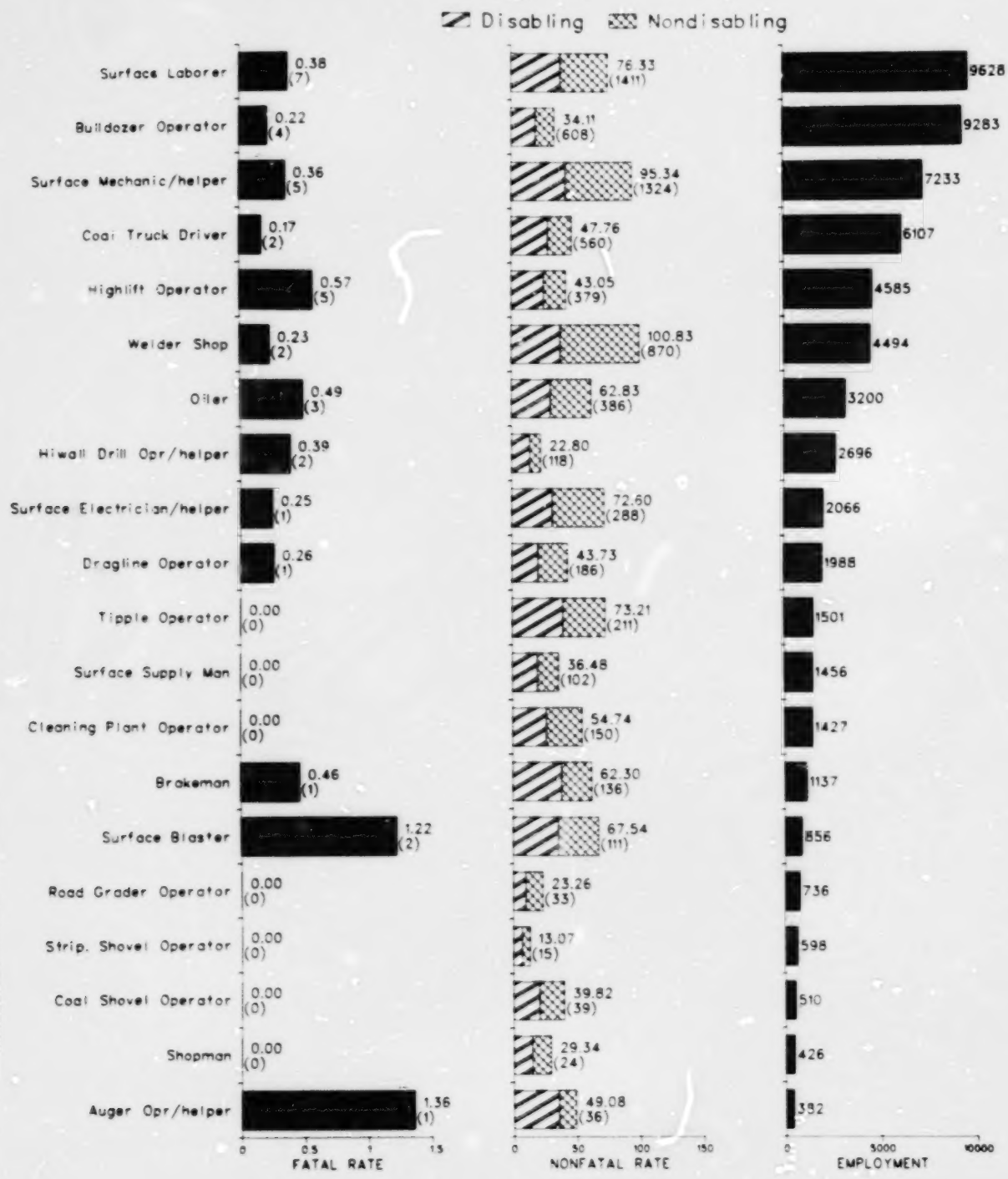

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FIGURE 3. - Injury-incidence rates and employment for coal surface occupations, 1978.

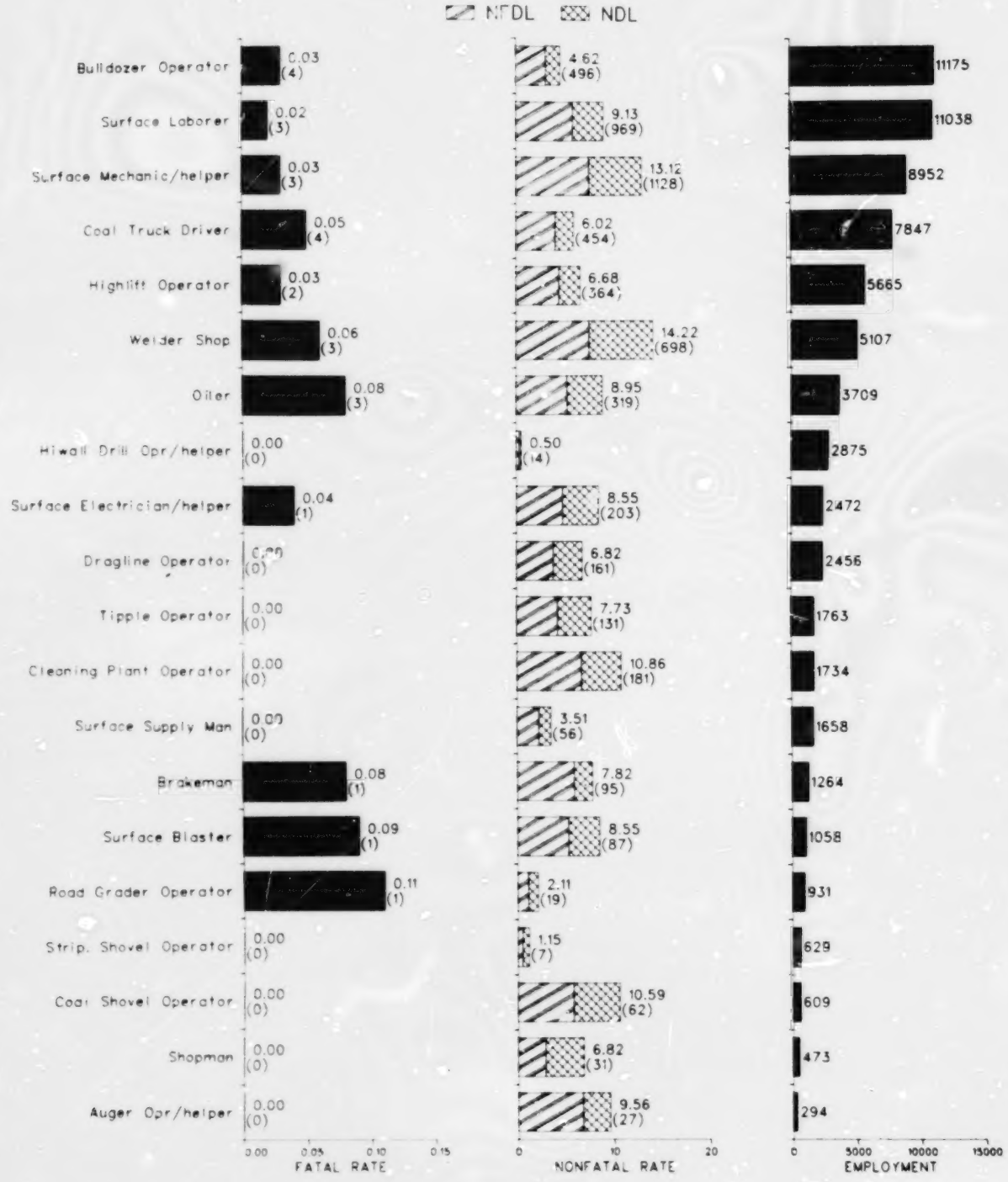

FIGURE 4. – Injury–incidence rates and employment for coal surface occupations, 1979.

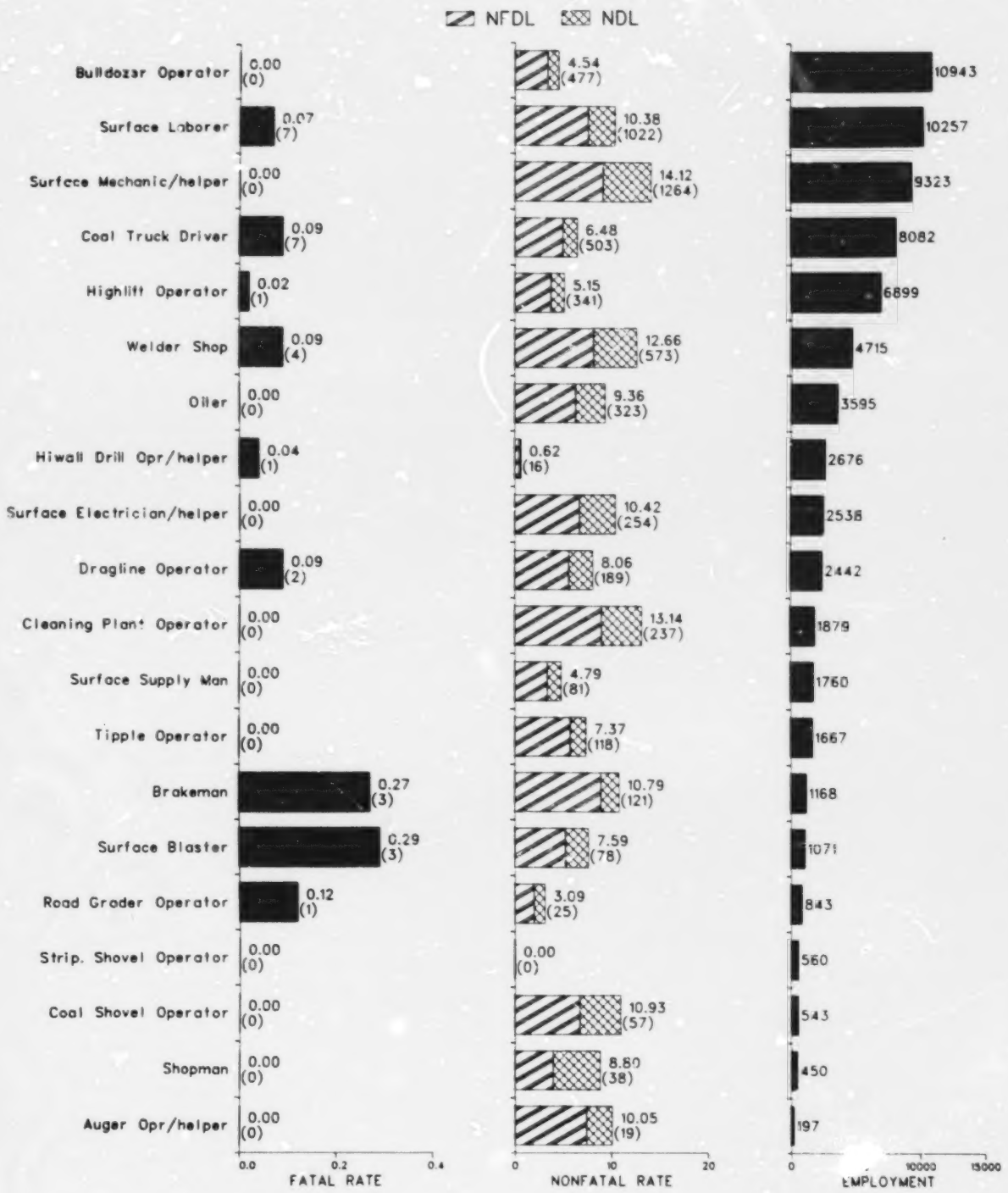

FIGURE 5. – Injury – incidence rates and employment for coal surface occupations, 1980.

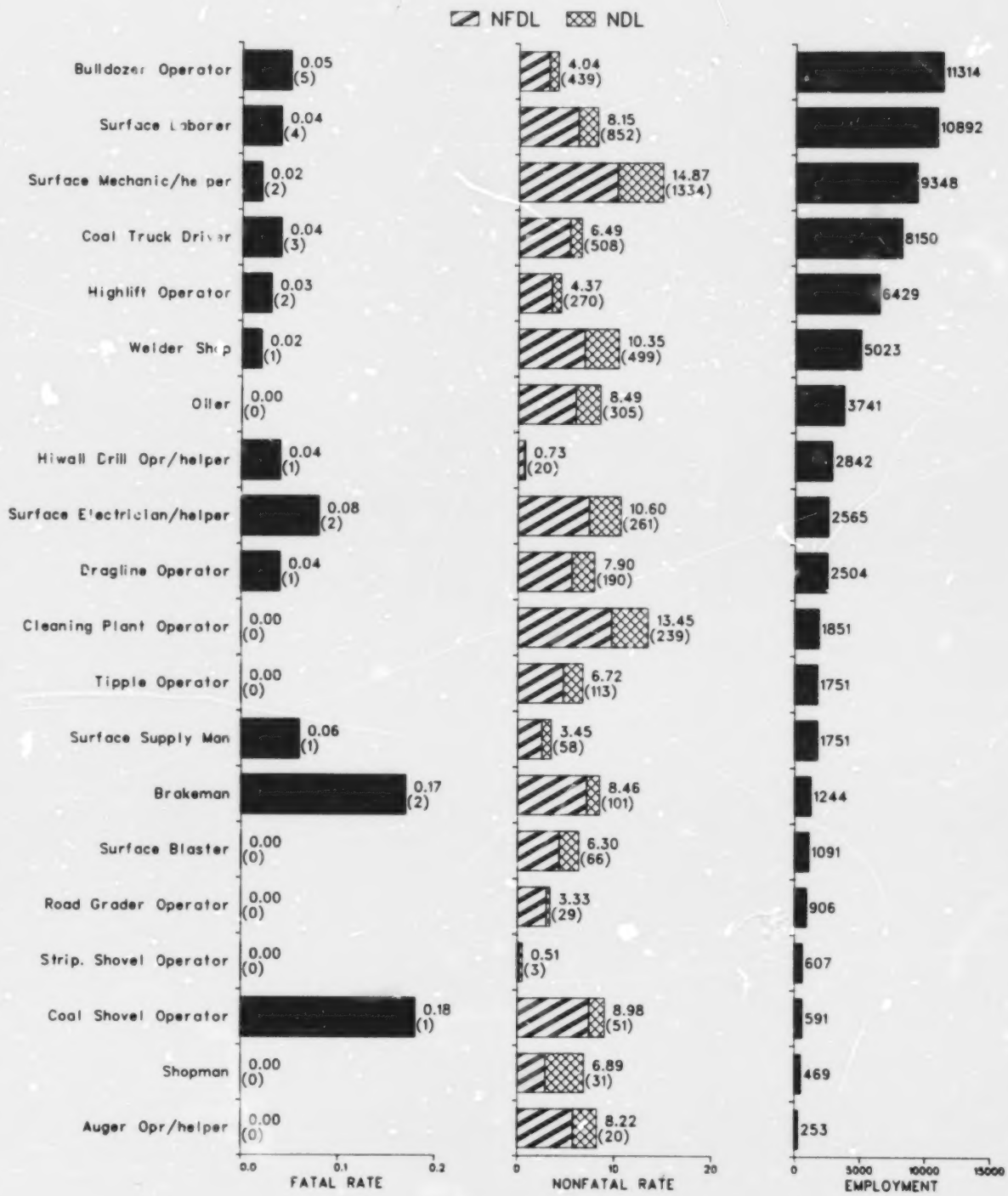

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FIGURE 6. – Injury–frequency rates and average employment for coal surface occupations, 1976–77.

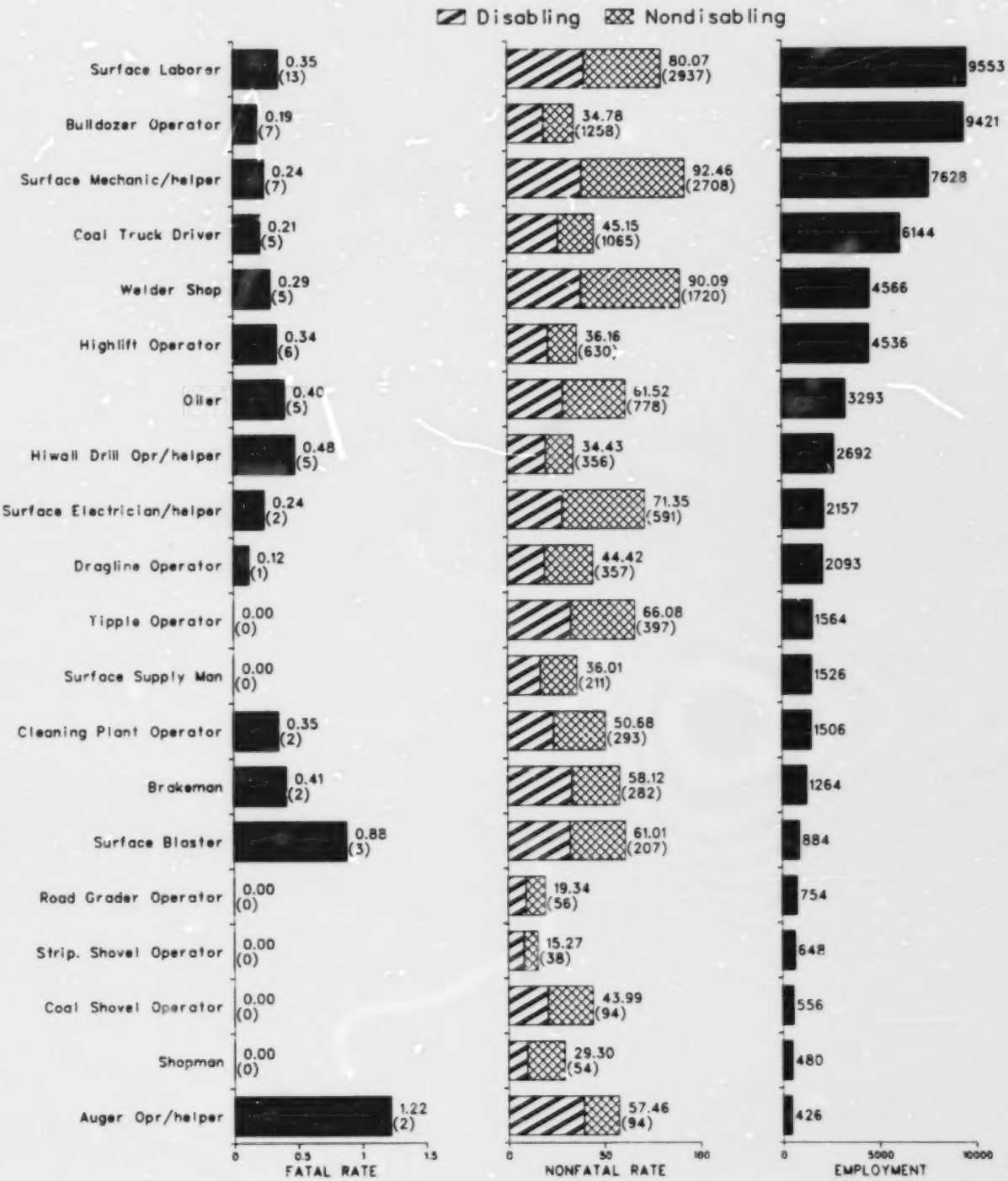

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FIGURE 7. – Injury–frequency rates and average employment for coal surface occupations, 1972–77.

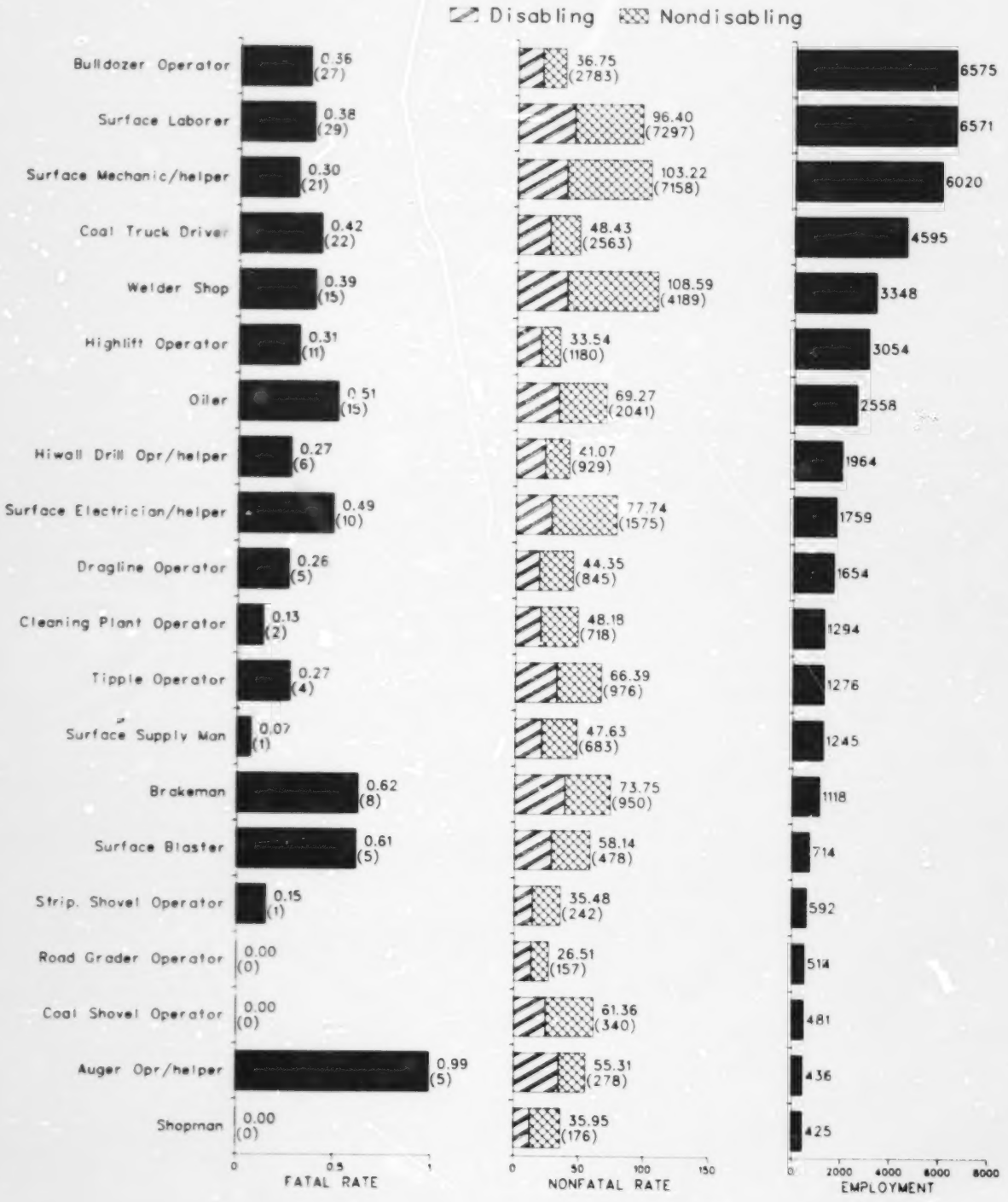

FIGURE 8. – Injury–incidence rates and average employment for coal surface occupations, 1978–80.

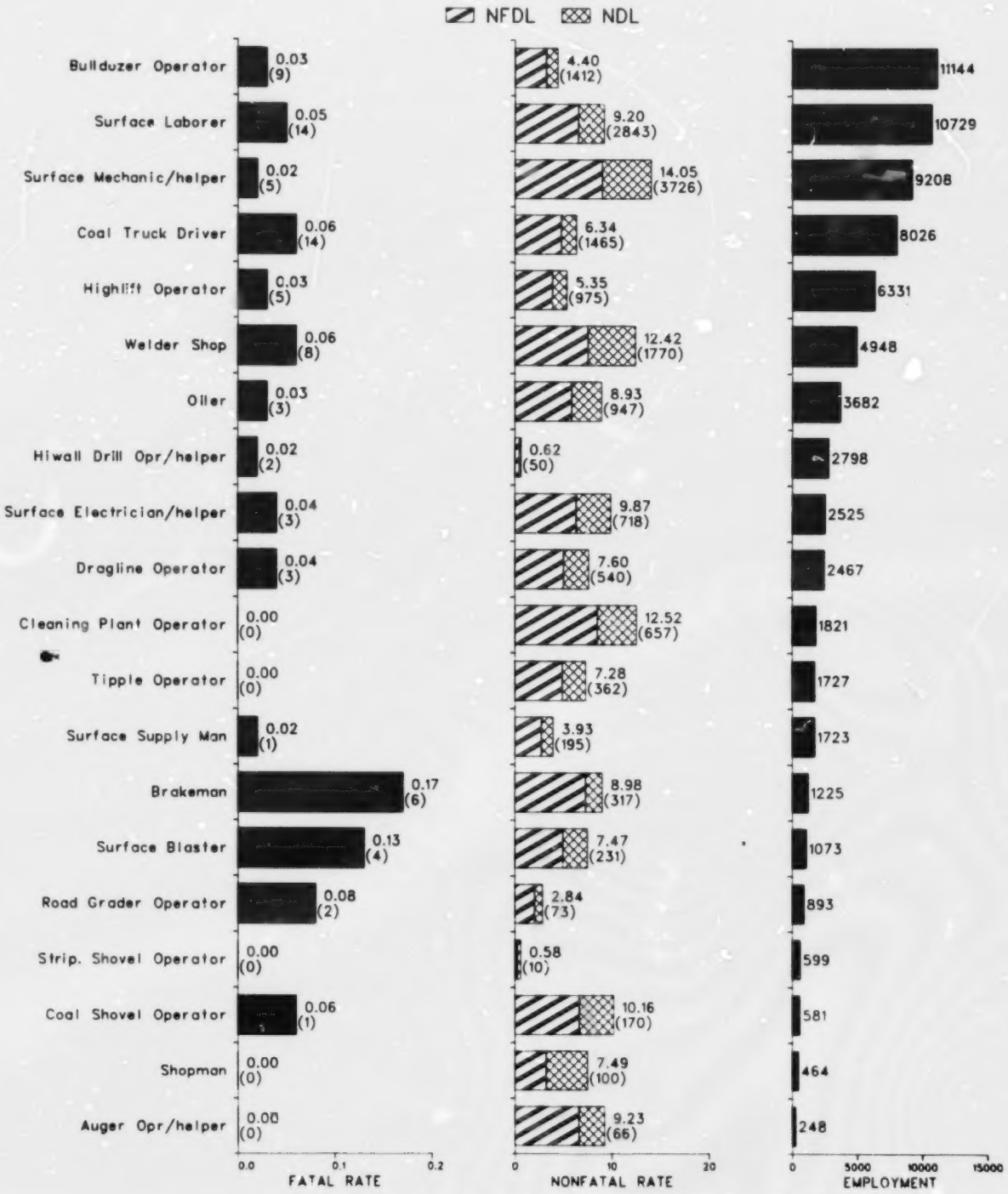

FIGURE 9. – Injury-frequency rates and employment for coal underground occupations, 1976.

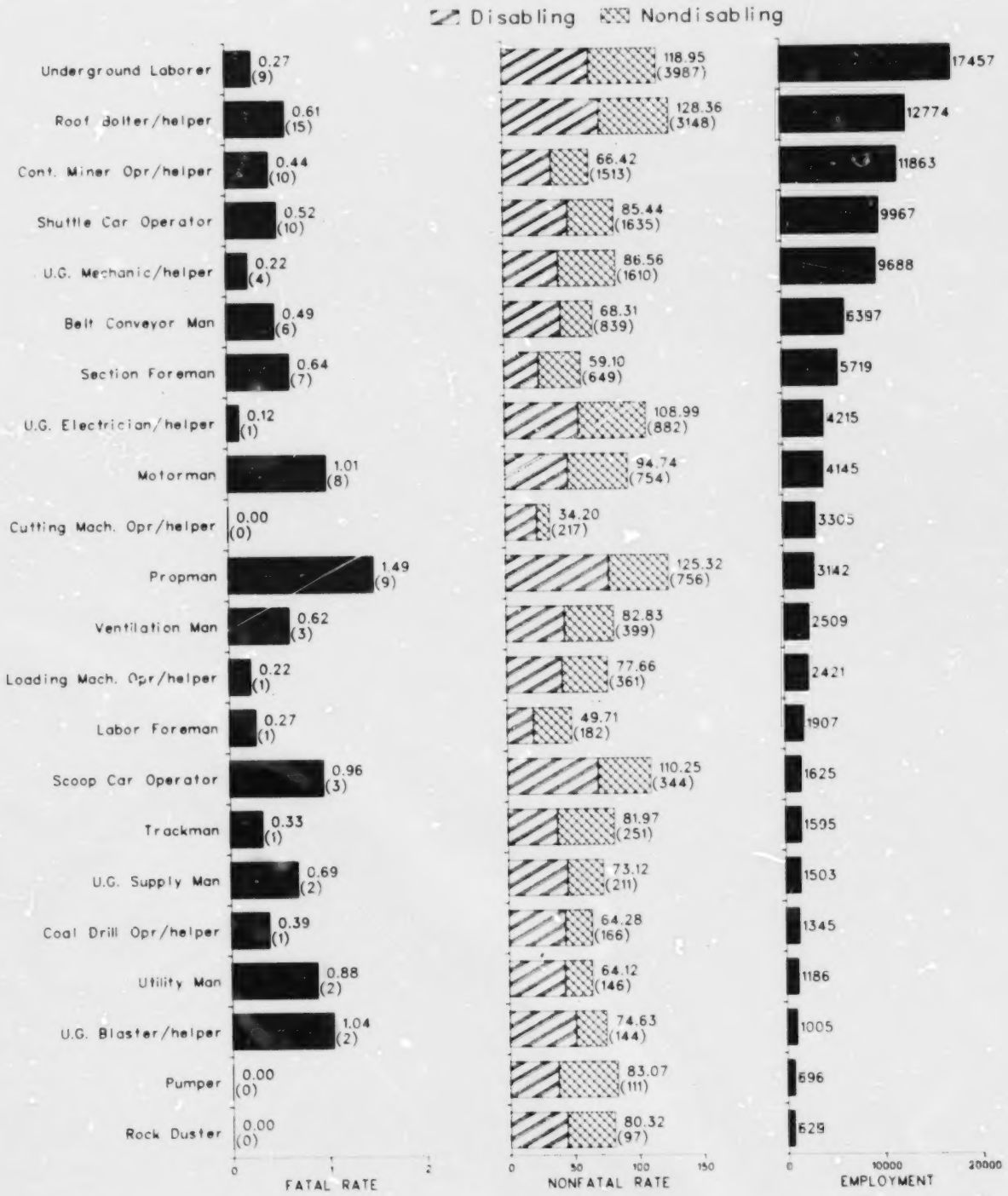

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FIGURE 10. – Injury–frequency rates and employment for coal underground occupations, 1977.

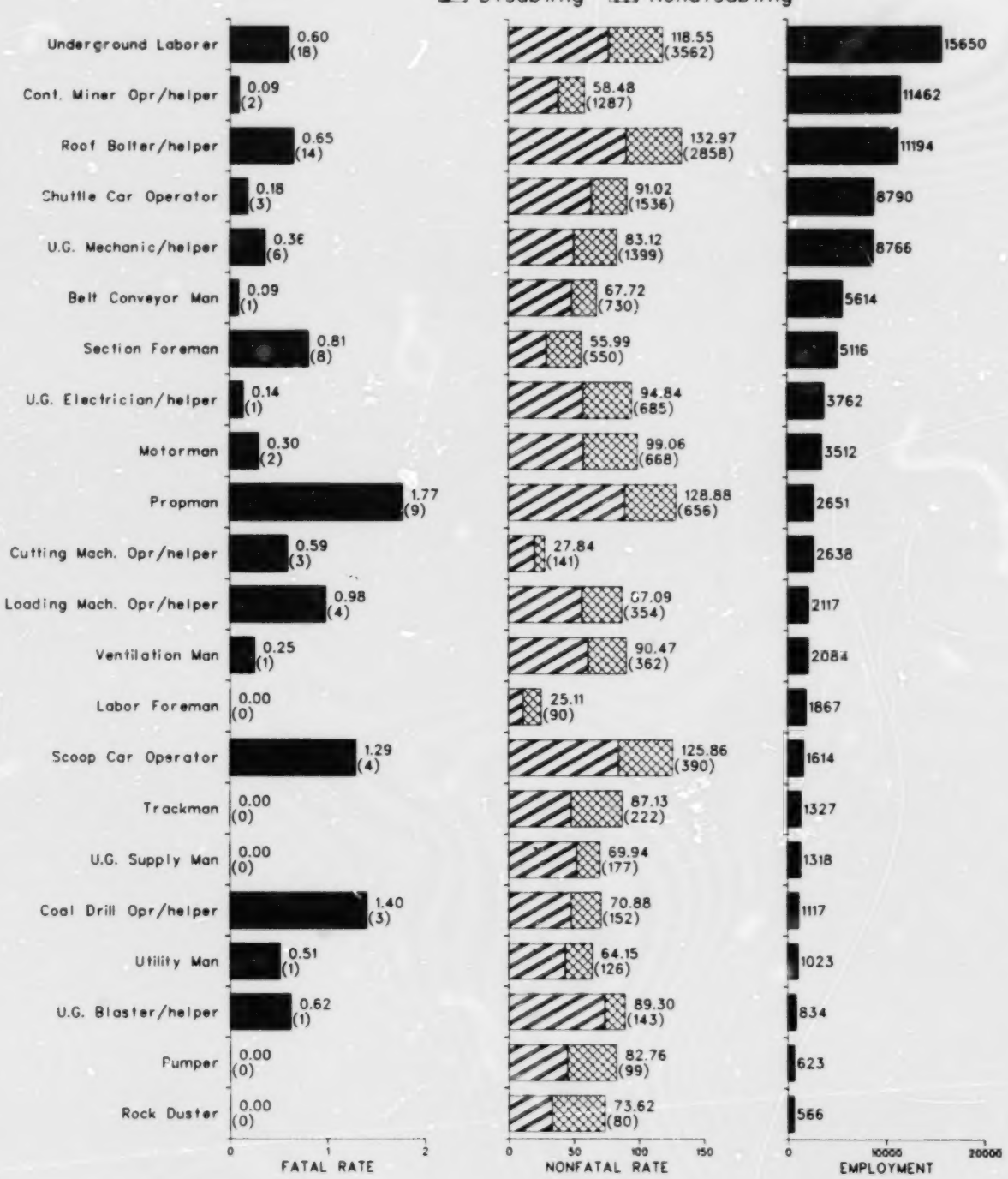

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FIGURE 11. – Injury-incidence rates and employment for coal underground occupations, 1978.

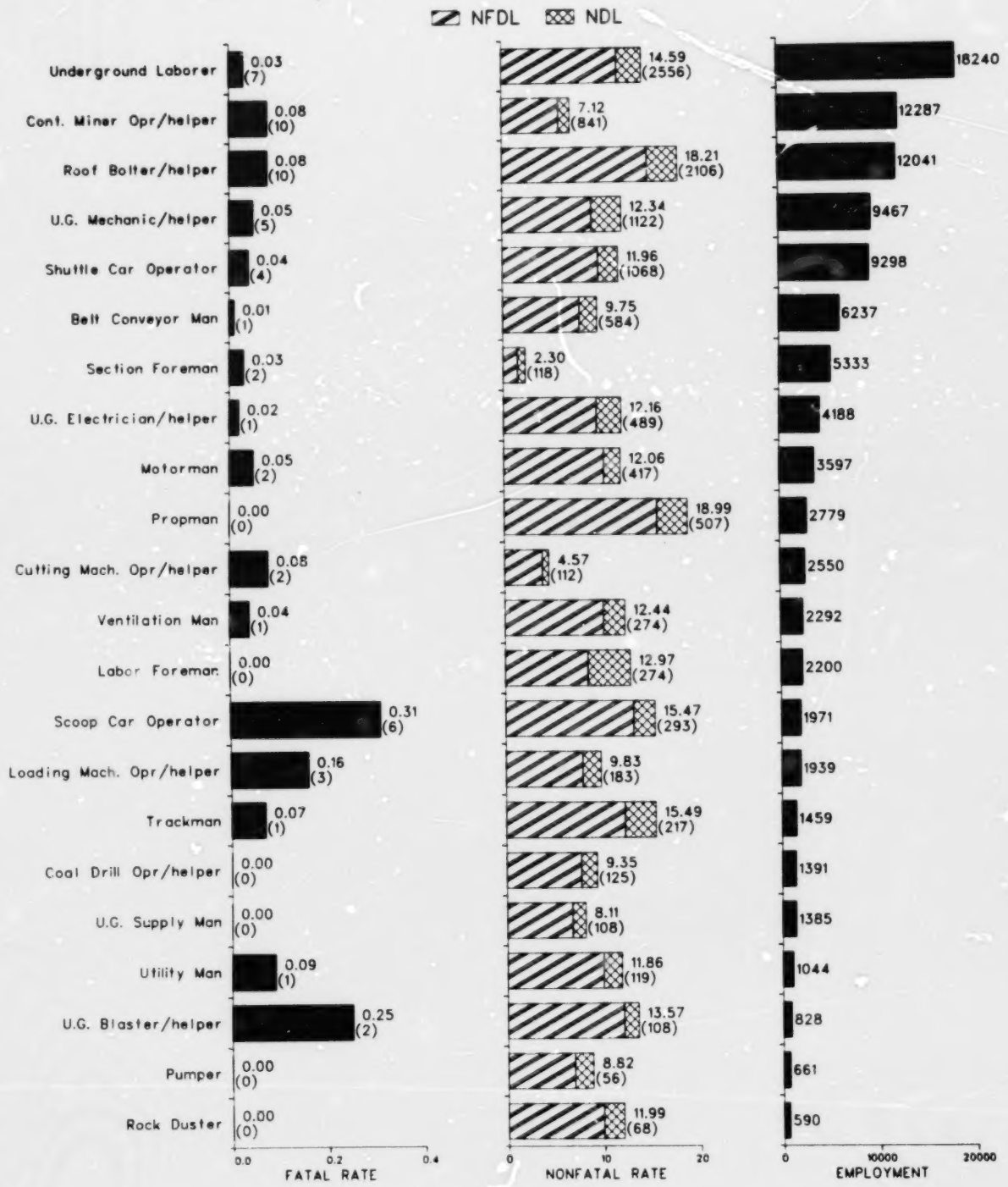

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FIGURE 12. - Injury-incidence rates and employment for coal underground occupations, 1979.

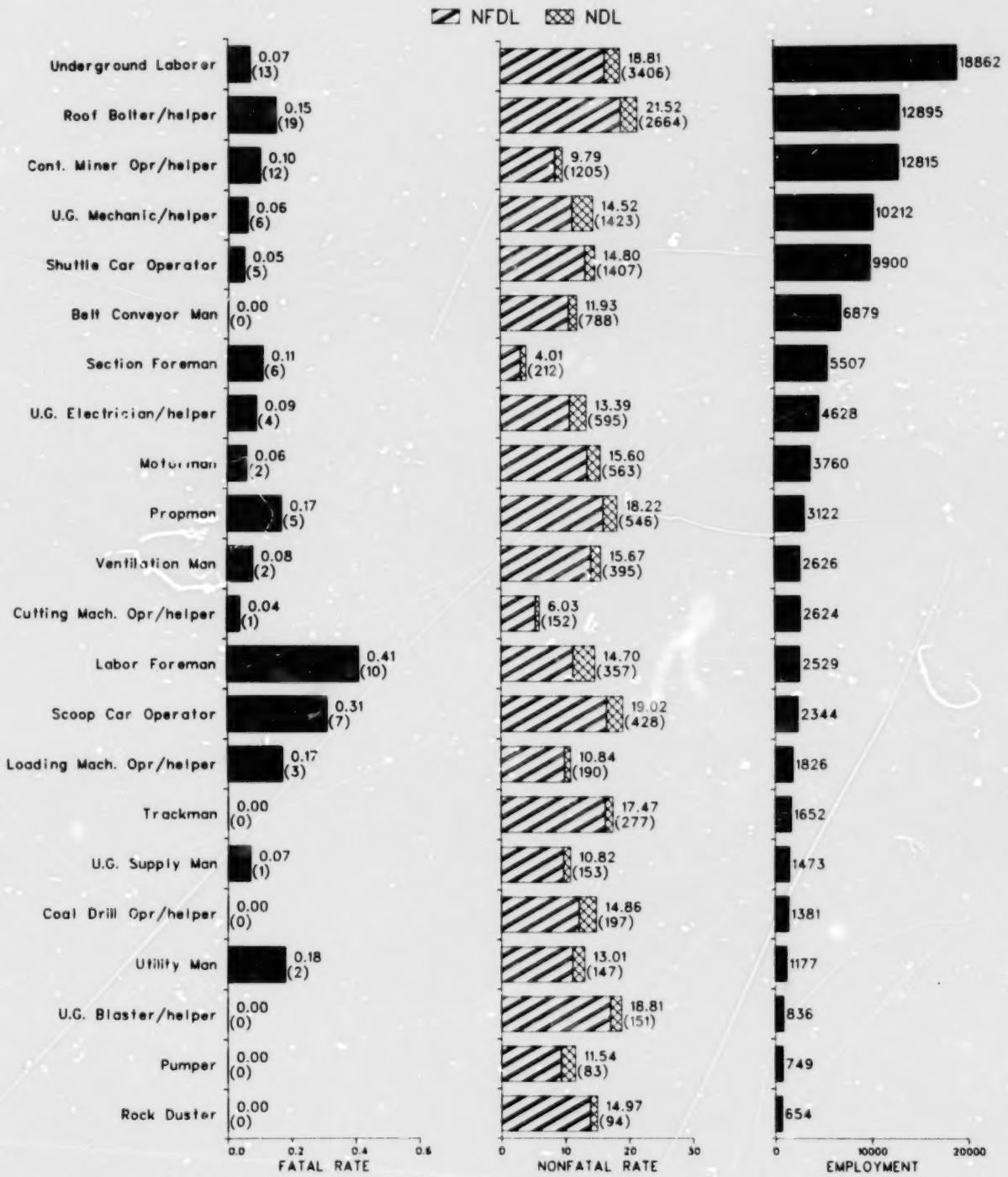

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FIGURE 13. – Injury – incidence rates and employment for coal underground occupations, 1980.

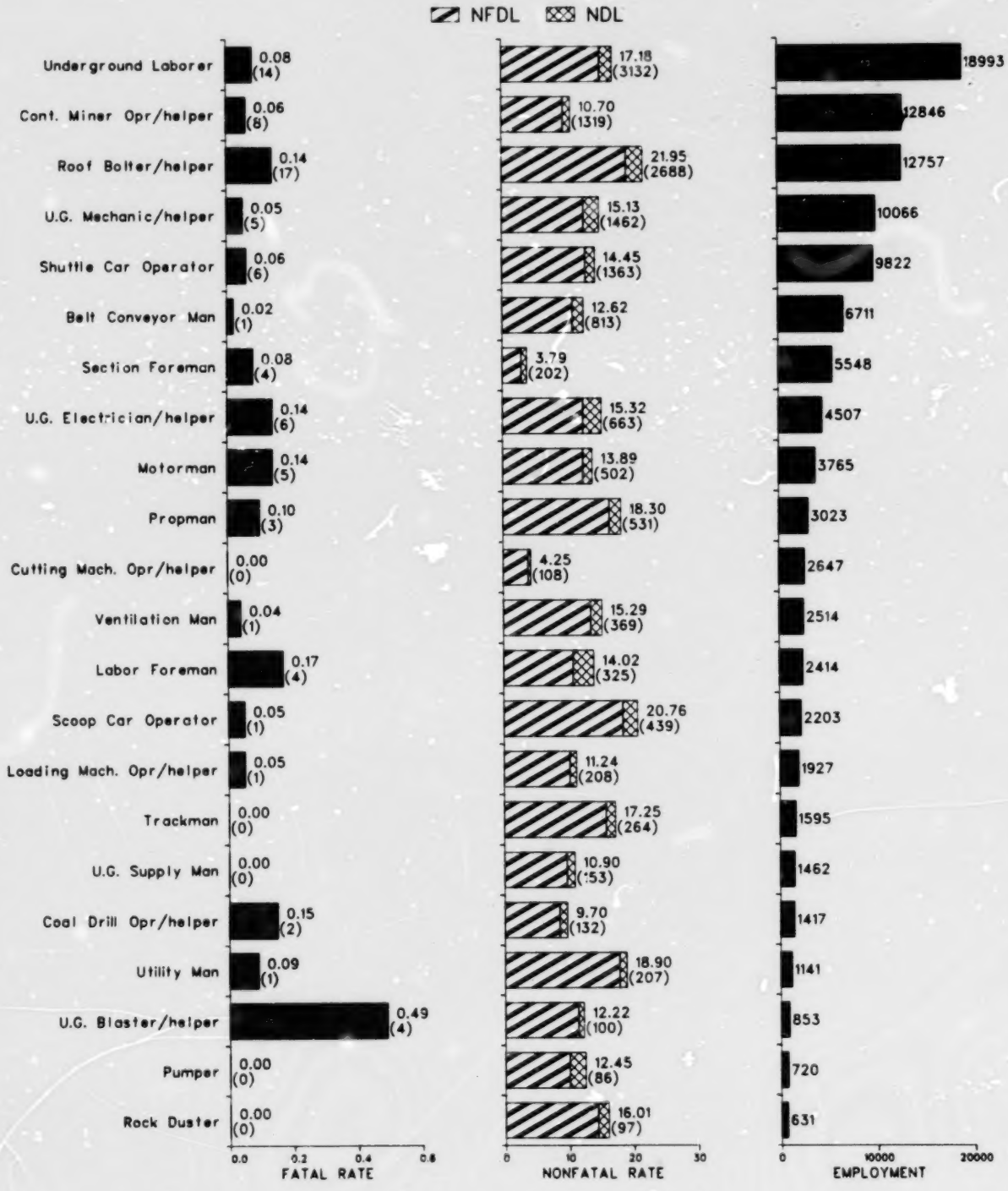

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FIGURE 14.– Injury–frequency rates and average employment for coal underground occupations, 1976–77.

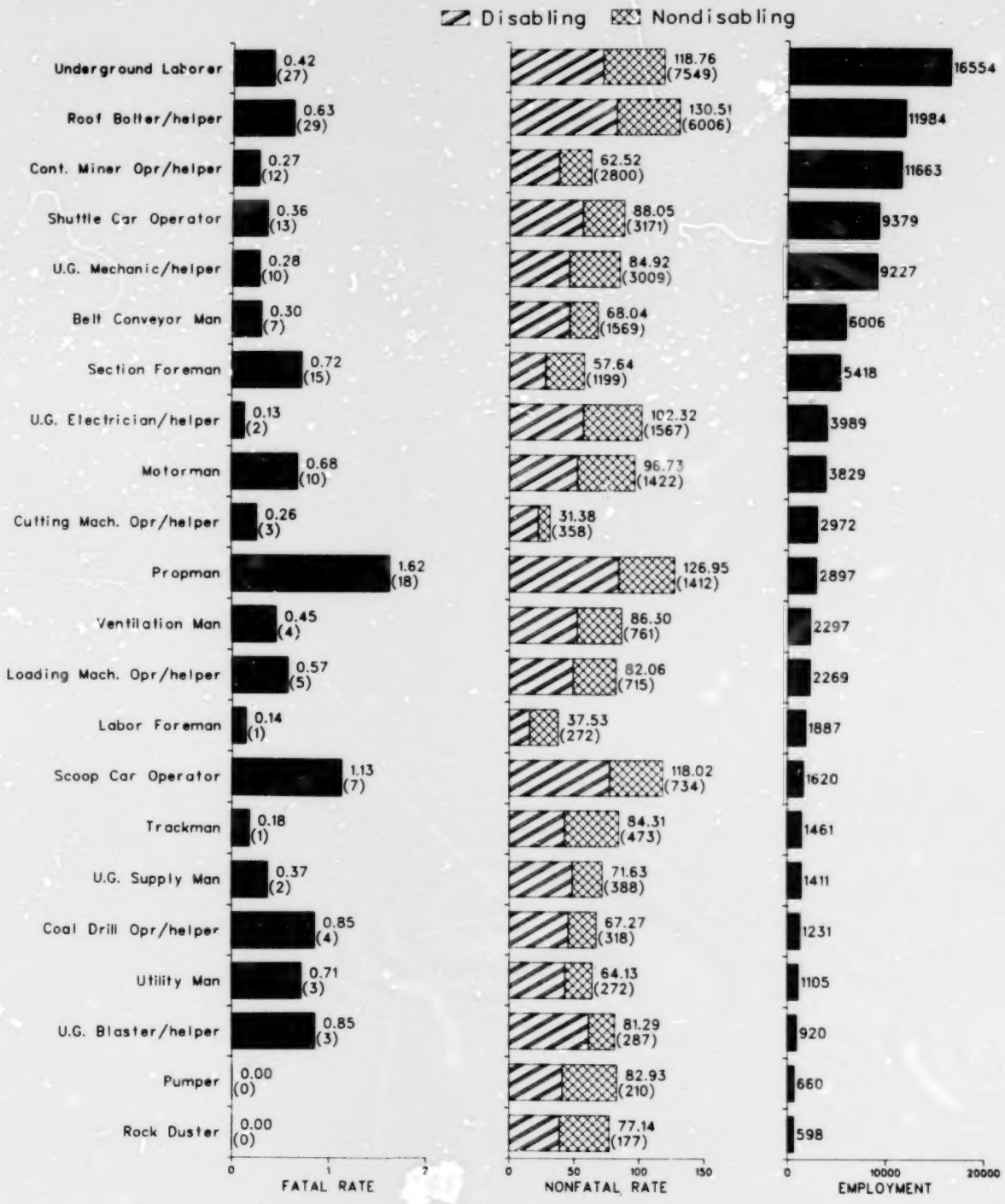

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FIGURE 15.- Injury-frequency rates and average employment for coal underground occupations, 1972-77.

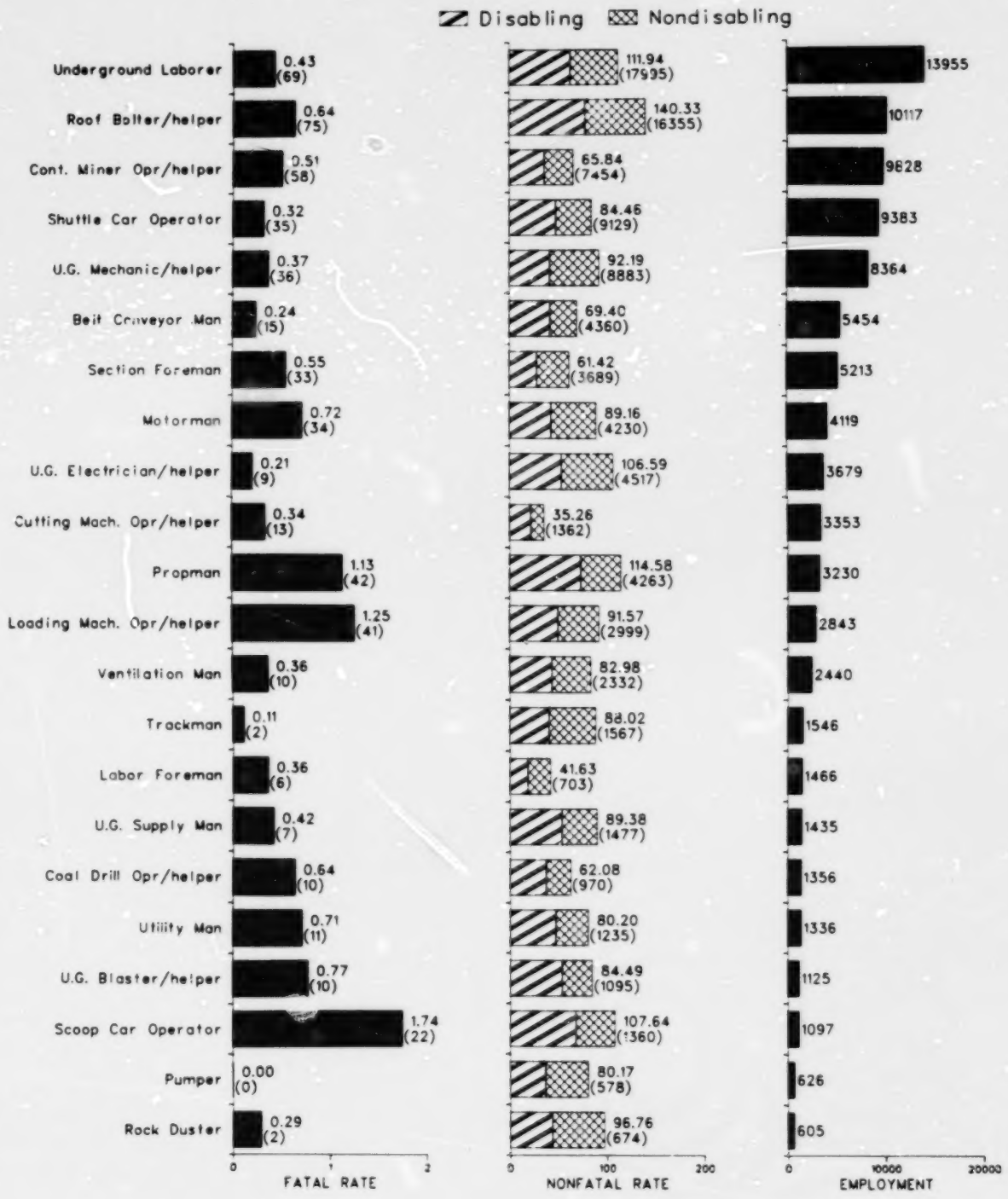

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FIGURE 16.– Injury–incidence rates and average employment for coal underground occupations, 1978–80.

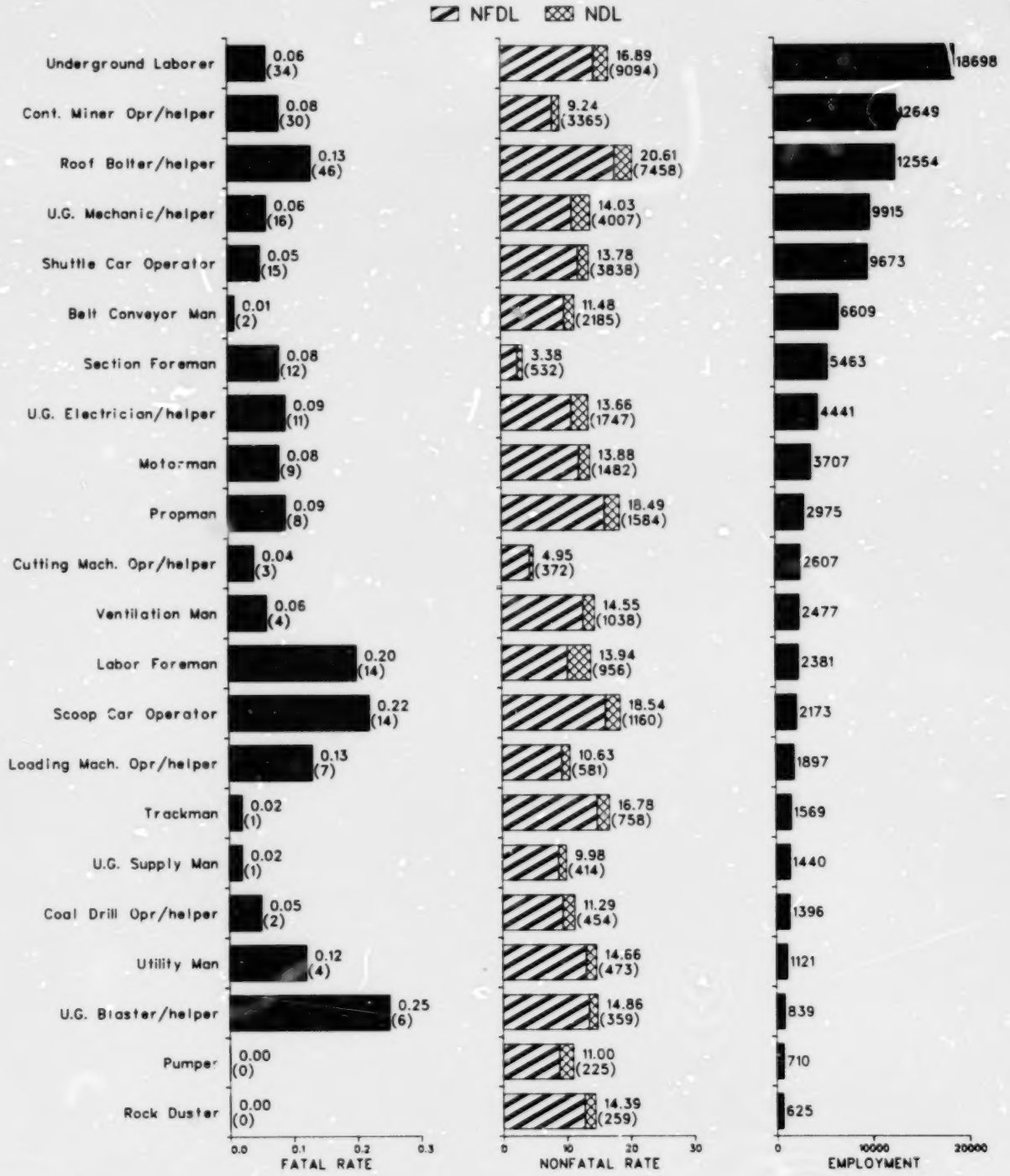

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FIGURE 17. – Injury–frequency rates and employment for coal surface supervisory and staff occupations, 1976.

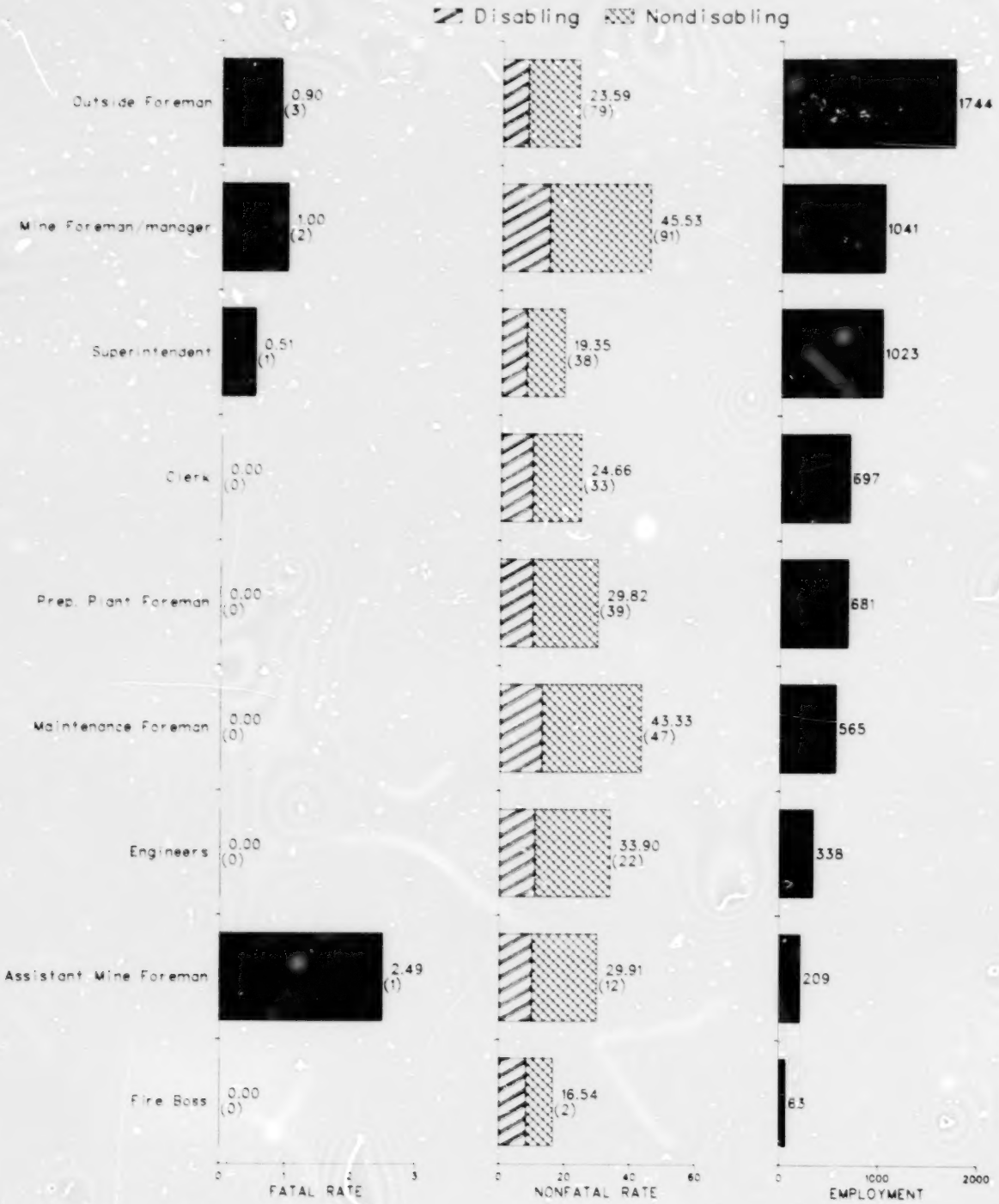

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FIGURE 18. – Injury-frequency rates and employment for coal surface supervisory and staff occupations, 1977.

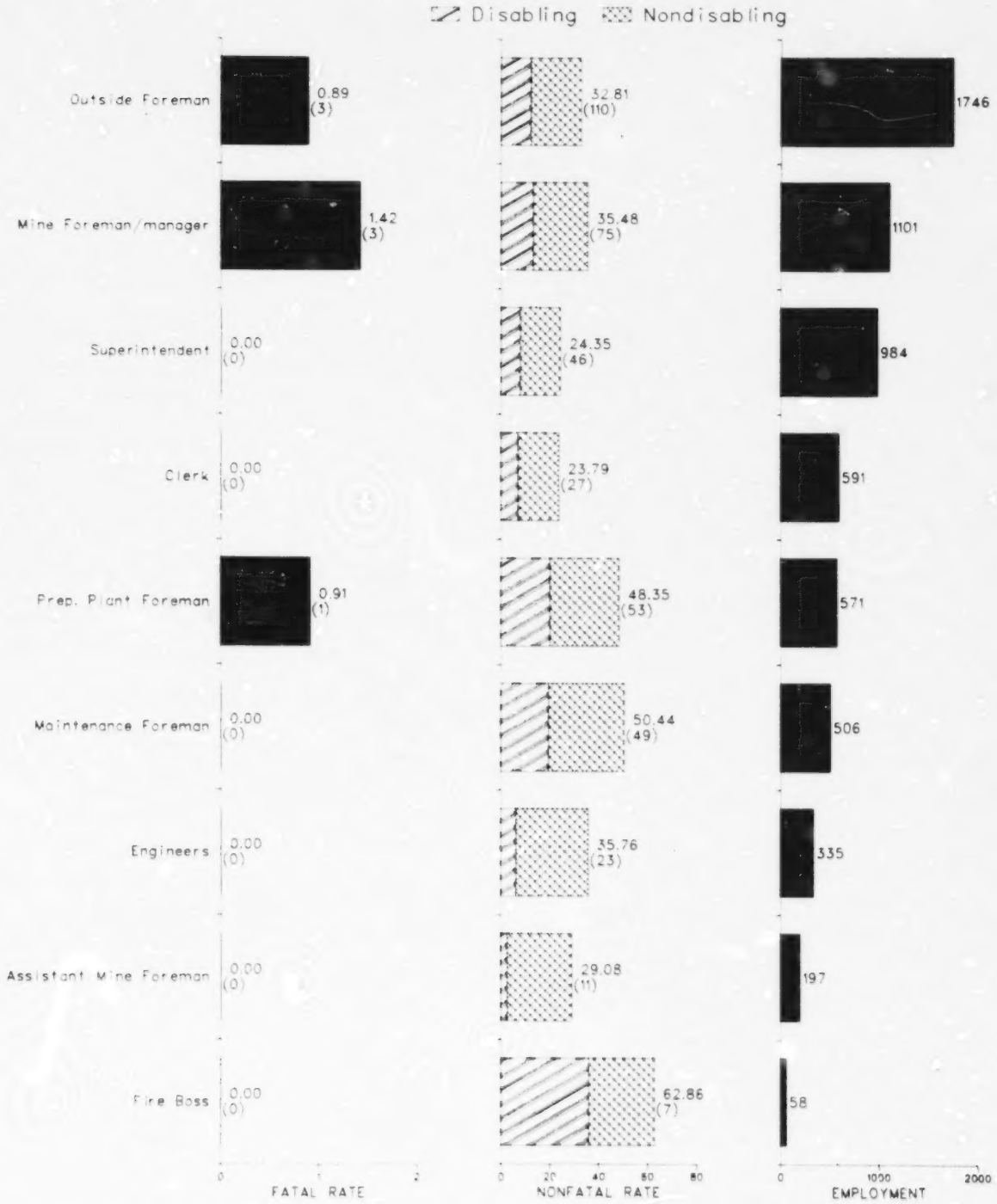

FIGURE 19. – Injury–incidence rates and employment for coal surface supervisory and staff occupations, 1978.

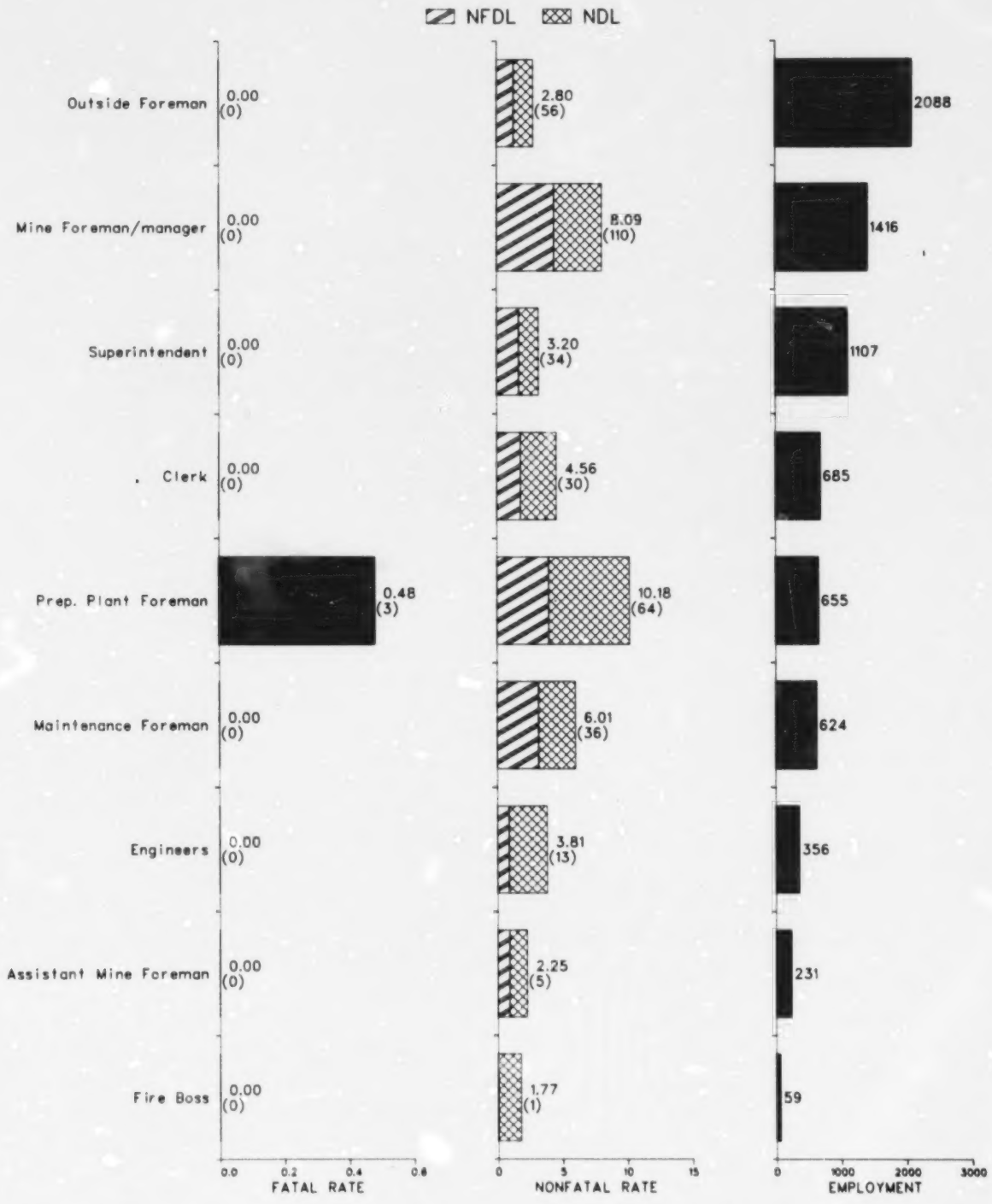

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FIGURE 20. - Injury-incidence rates and employment for coal surface supervisory and staff occupations, 1979.

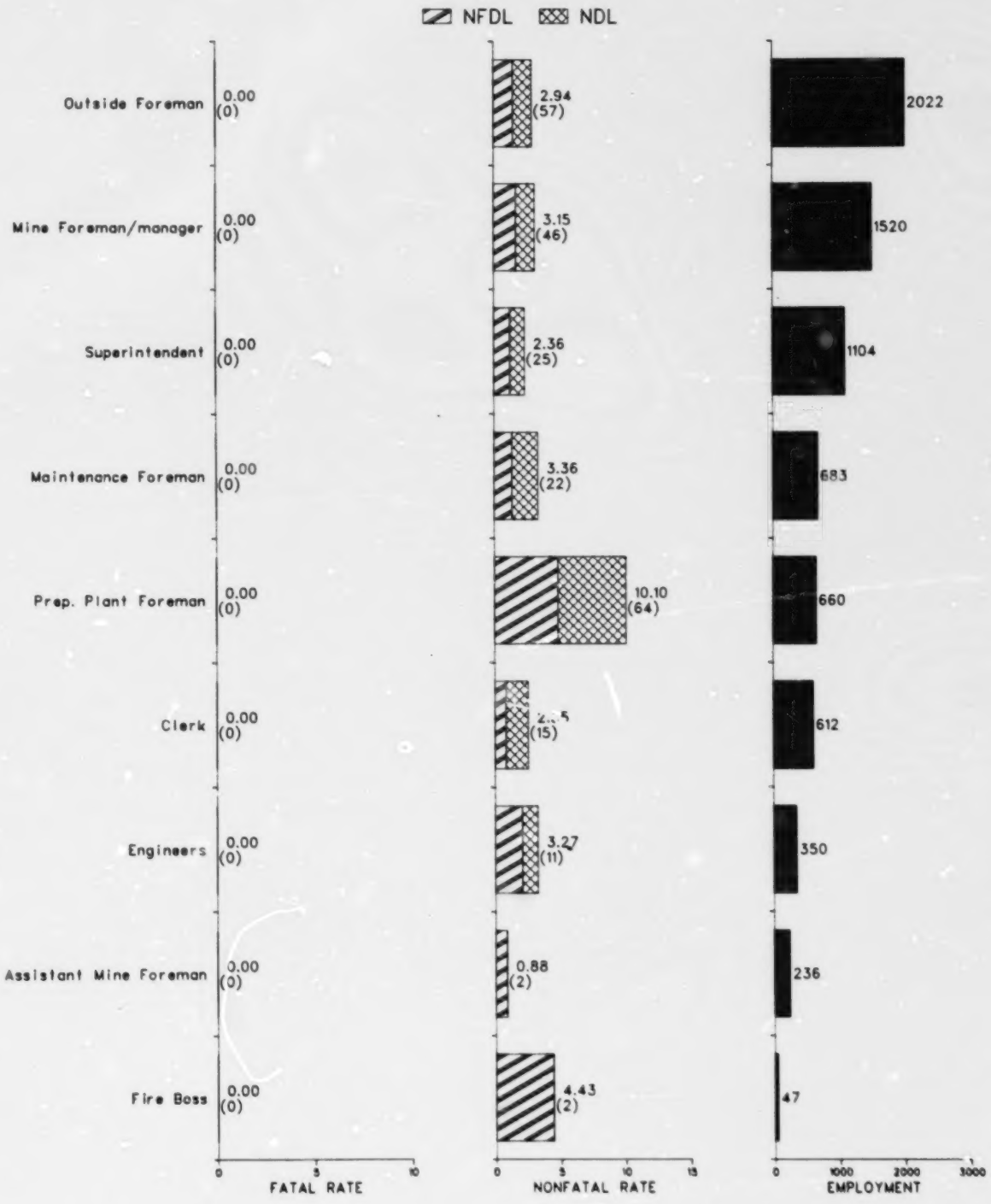

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FIGURE 21. - Injury-incidence rates and employment for coal surface supervisory and staff occupations, 1980.

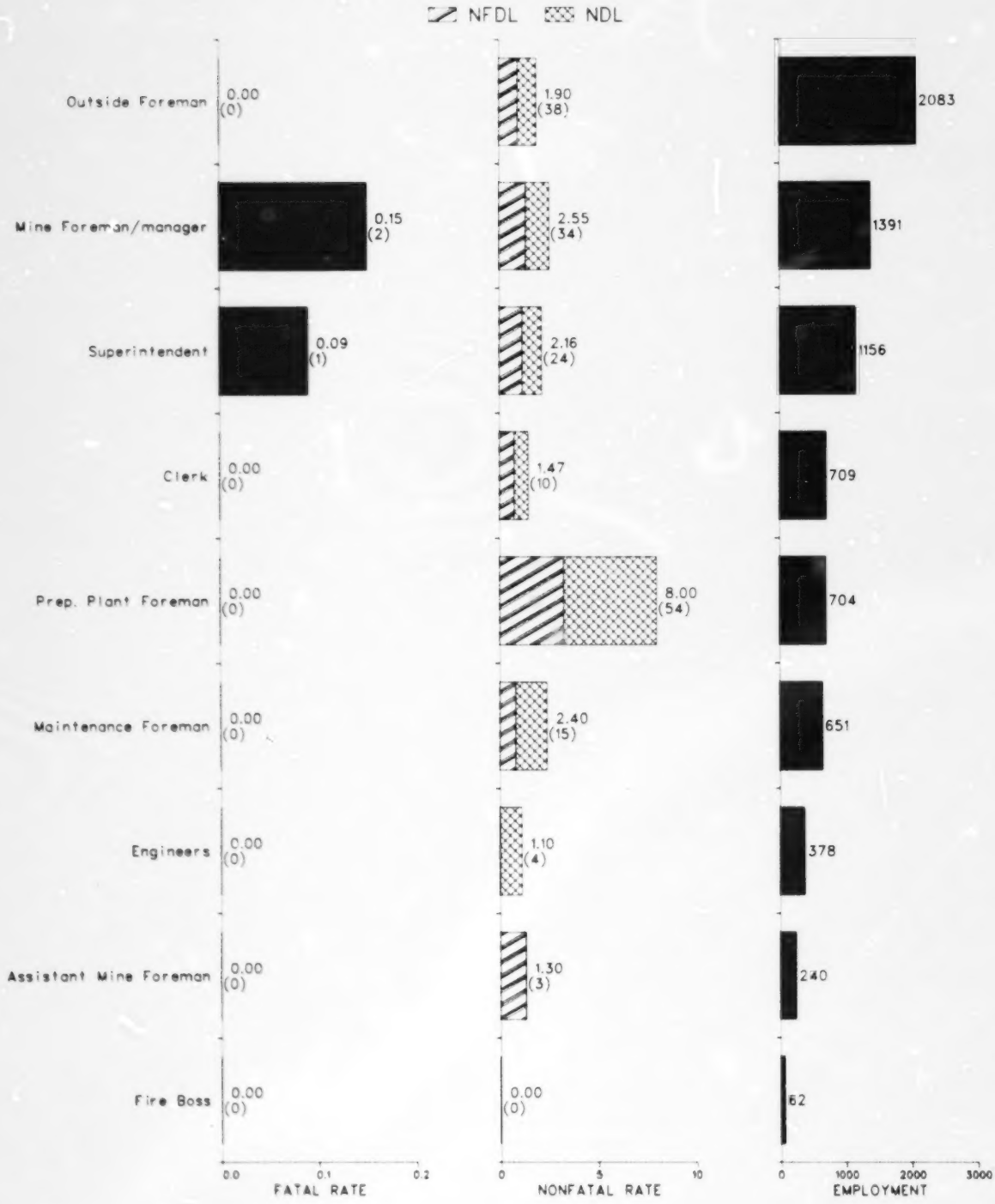

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FIGURE 22. – Injury-frequency rates and average employment for coal surf. supervisory and staff occupations, 1976–77.

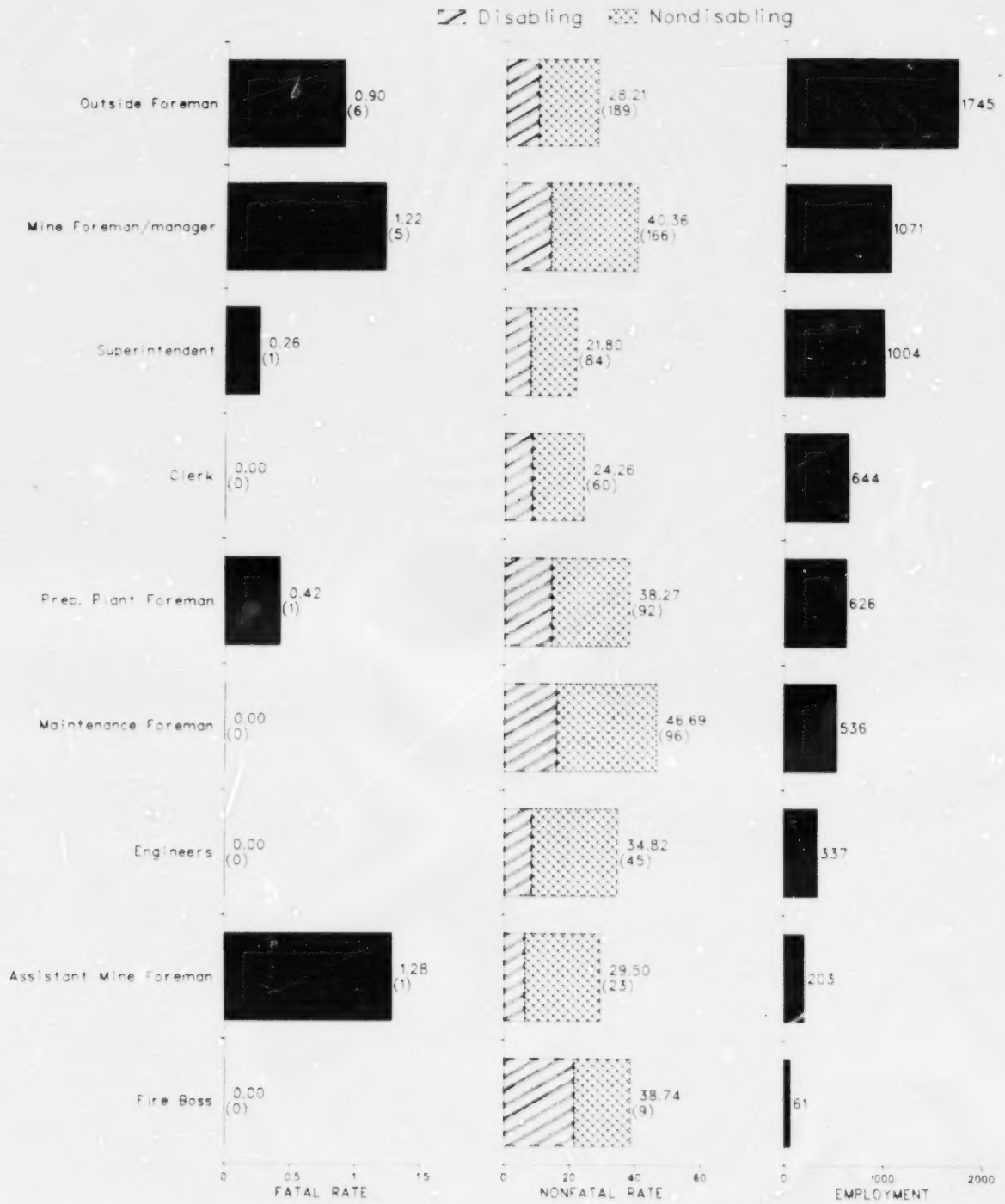

FIGURE 23.- Injury-incidence rates and average employment for coal surf. supervisory and staff occupations, 1978-80.

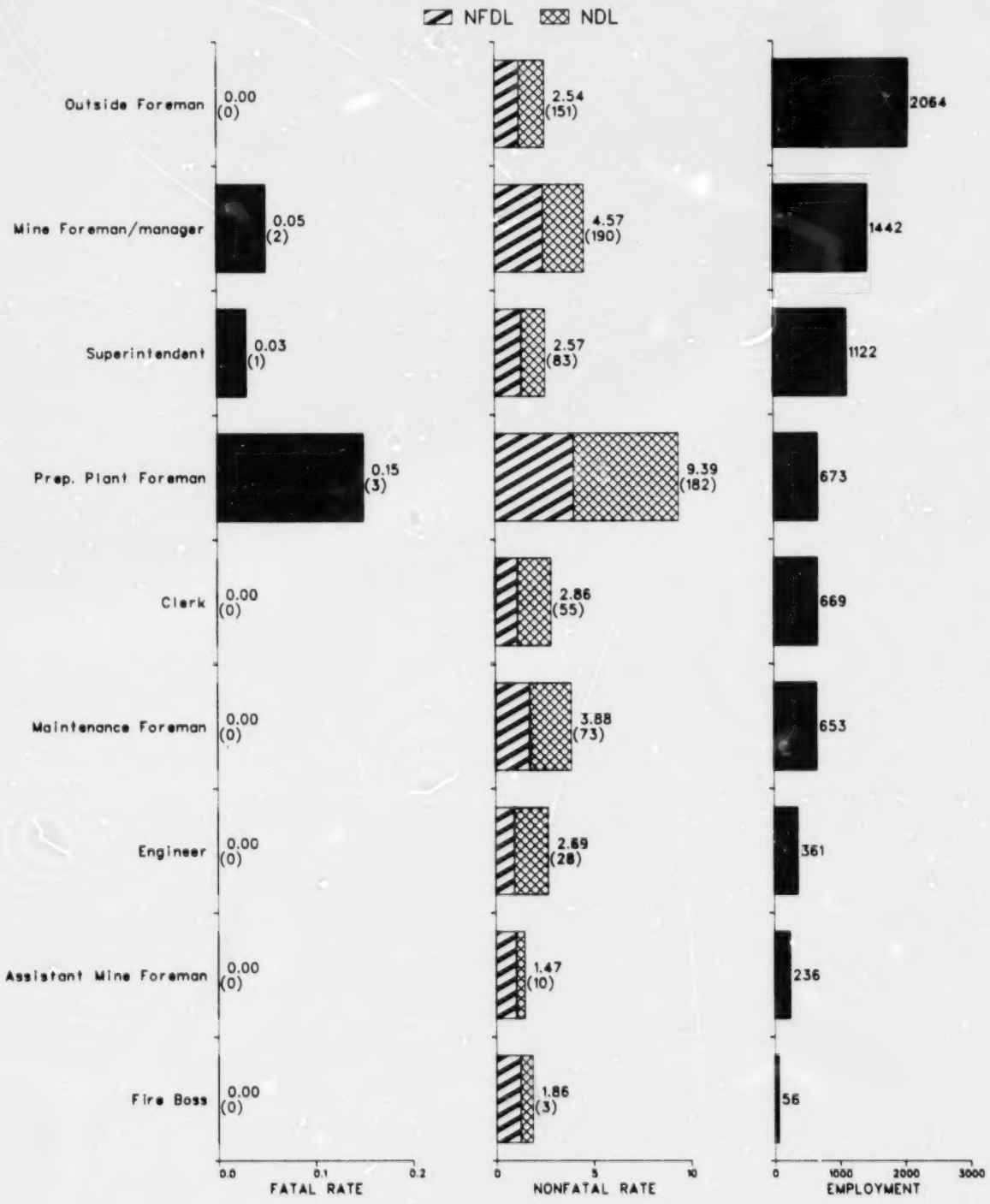

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FIGURE 24. – Injury-frequency rates and employment for coal underground supervisory and staff occupations, 1976.

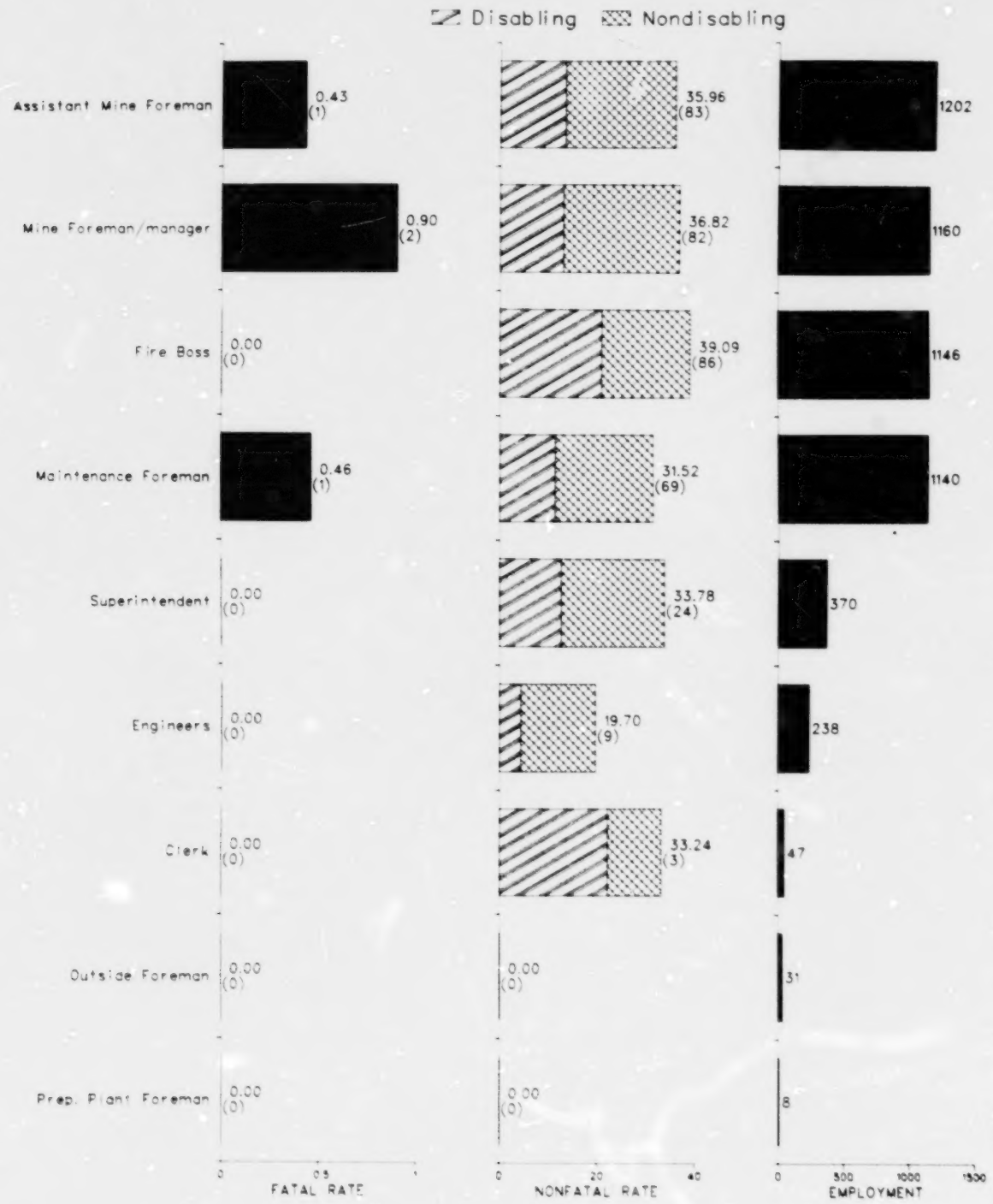

FIGURE 25. – Injury–frequency rates and employment for coal underground supervisory and staff occupations, 1977.

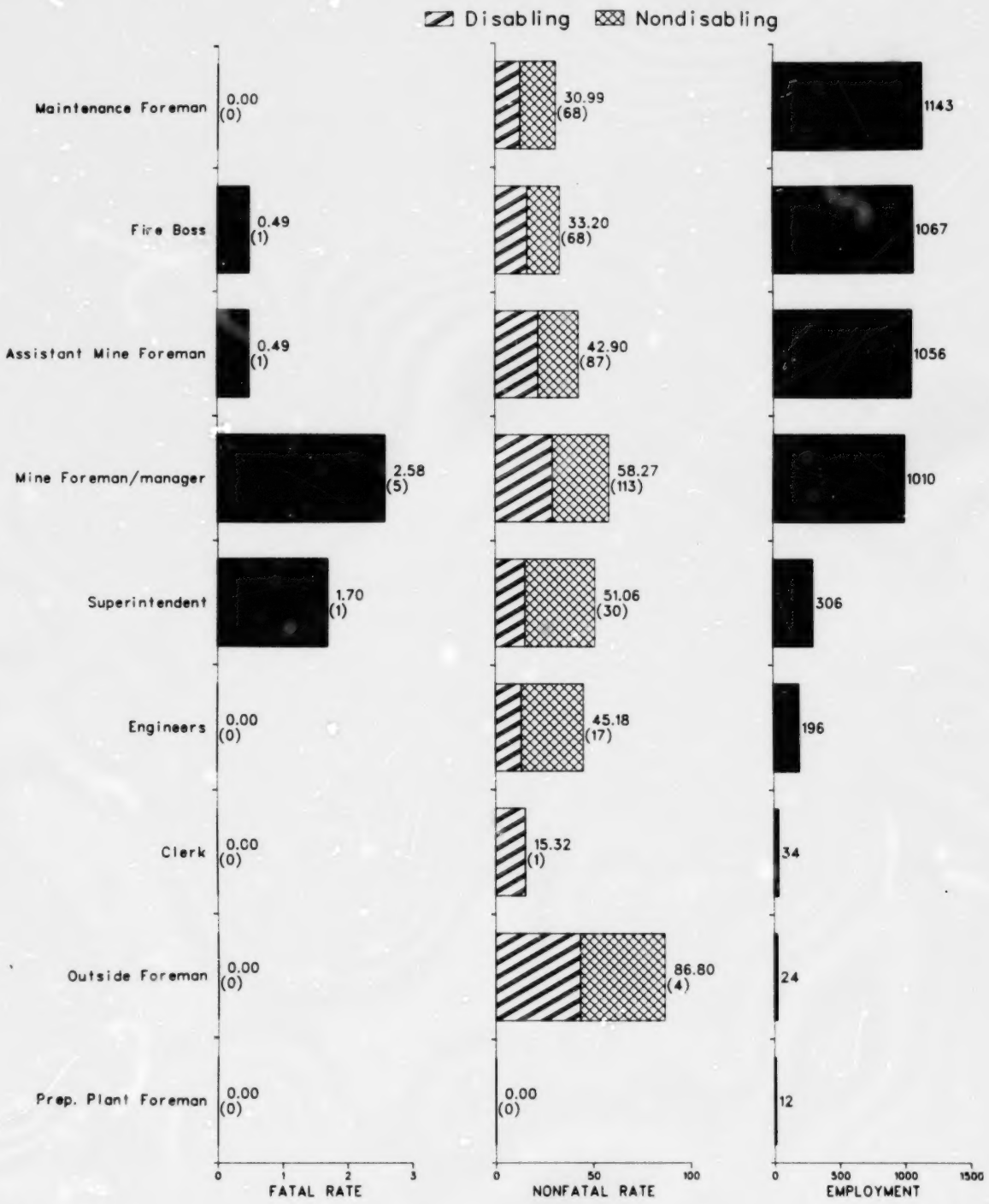

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FIGURE 26. – Injury-incidence rates and employment for coal underground supervisory and staff occupations, 1978.

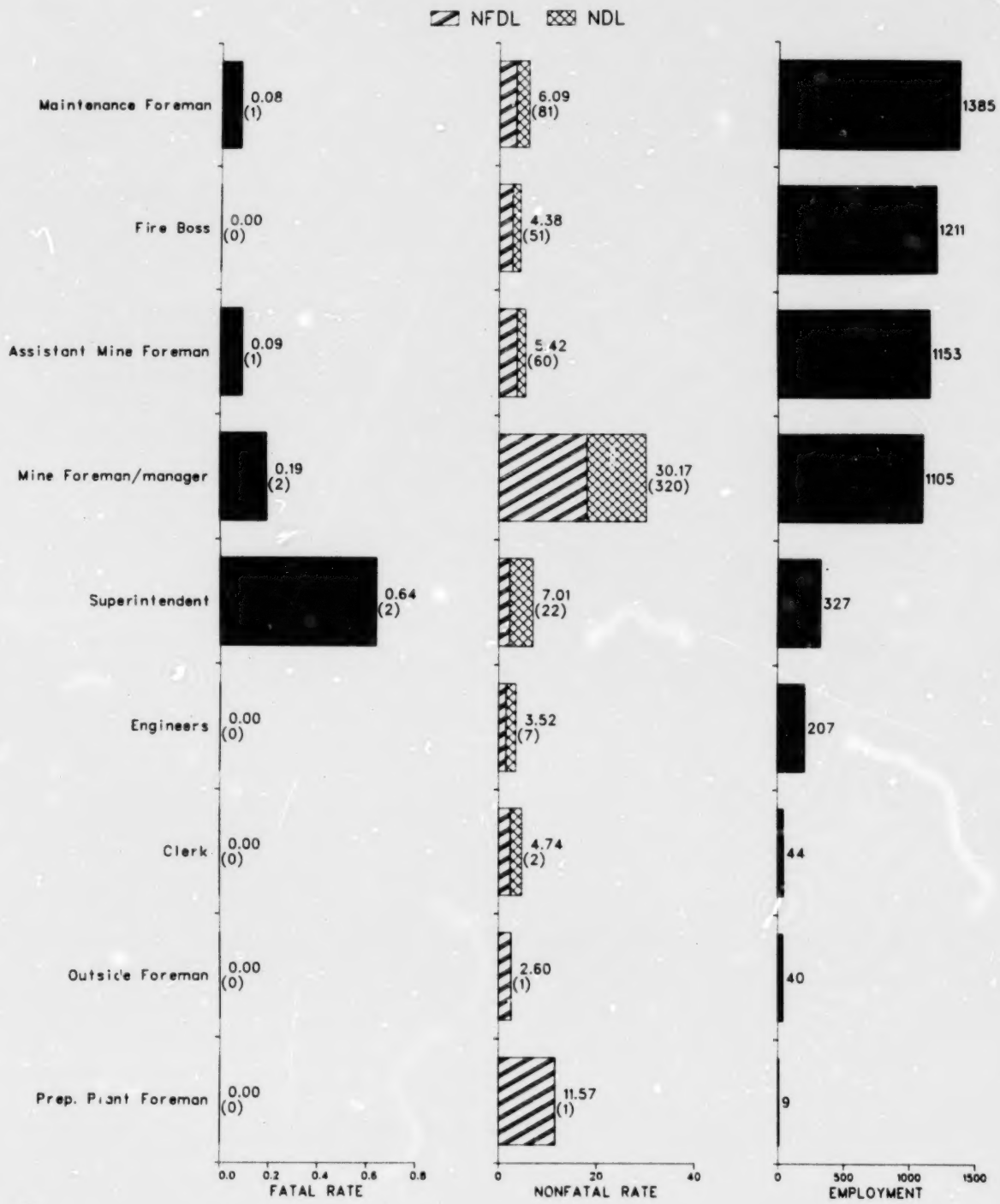

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FIGURE 27. – Injury–incidence rates and employment for coal underground supervisory and staff occupations, 1979.

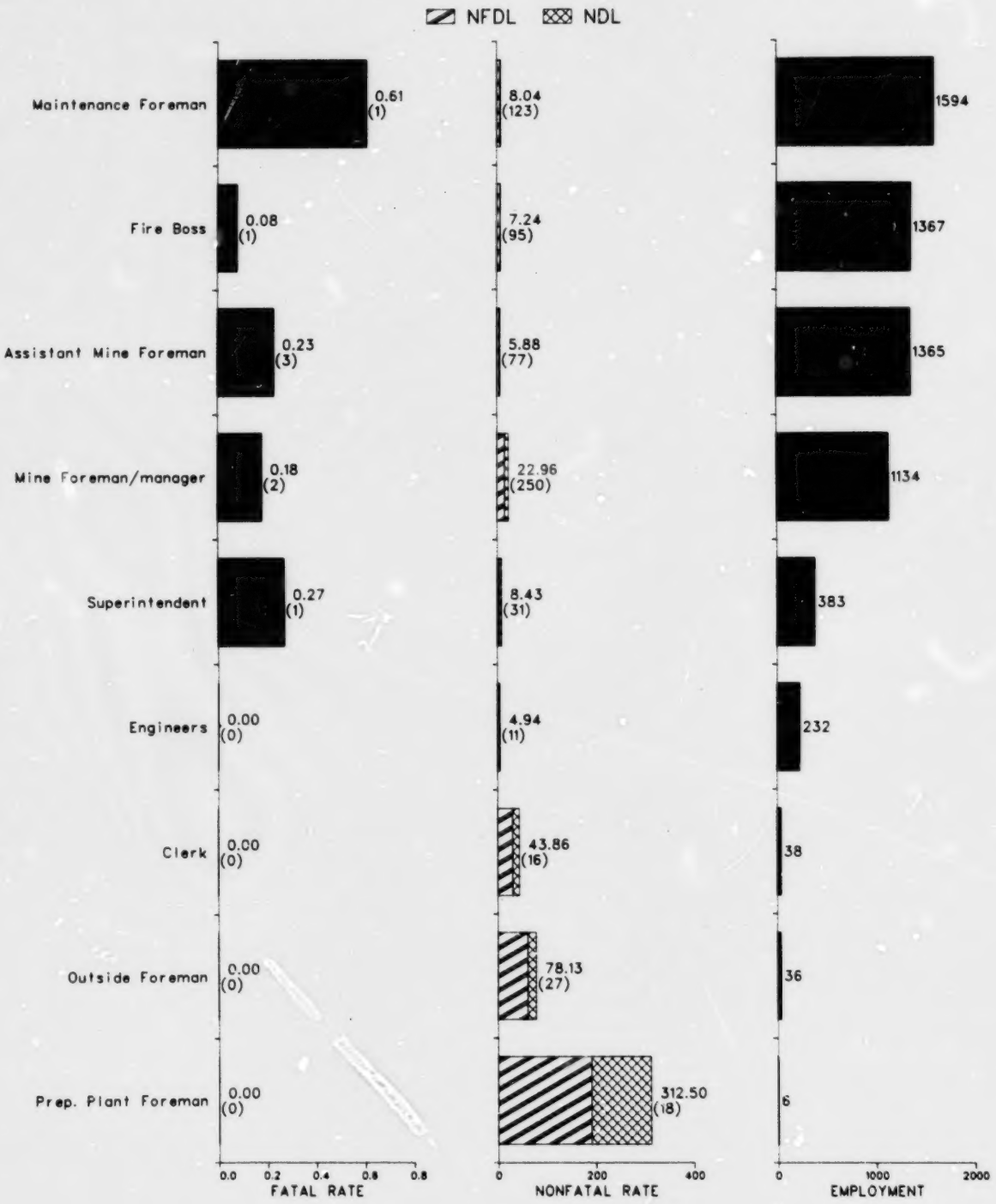

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FIGURE 28. - Injury-incidence rates and employment for coal underground supervisory and staff occupations, 1980.

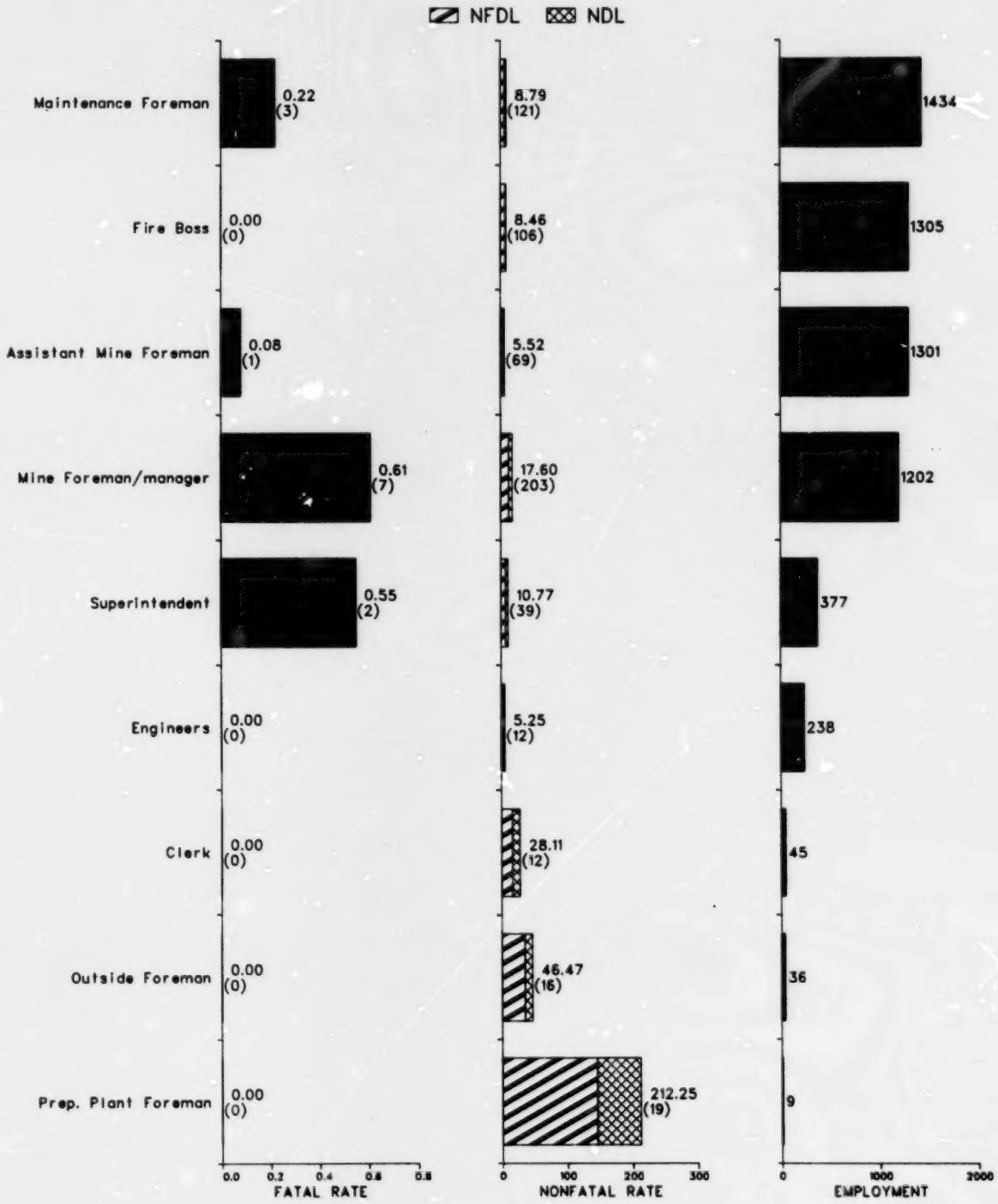

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FIGURE 29.- Injury-frequency rates and average employment for coal u.g. supervisory and staff occupations, 1976-77.

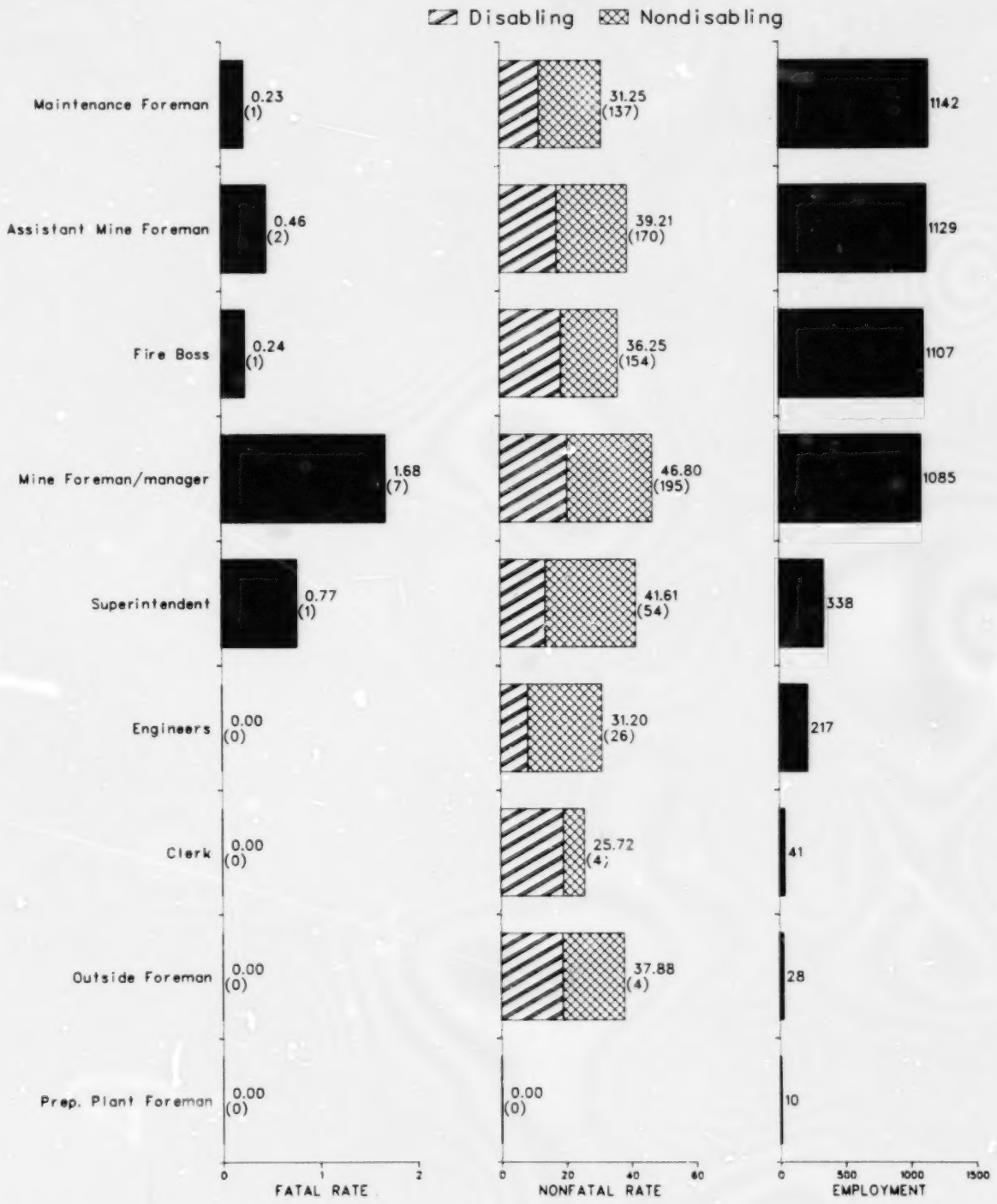

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FIGURE 30.- Injury-incidence rates and average employment for coal u.g. supervisory and staff occupations, 1978-80.

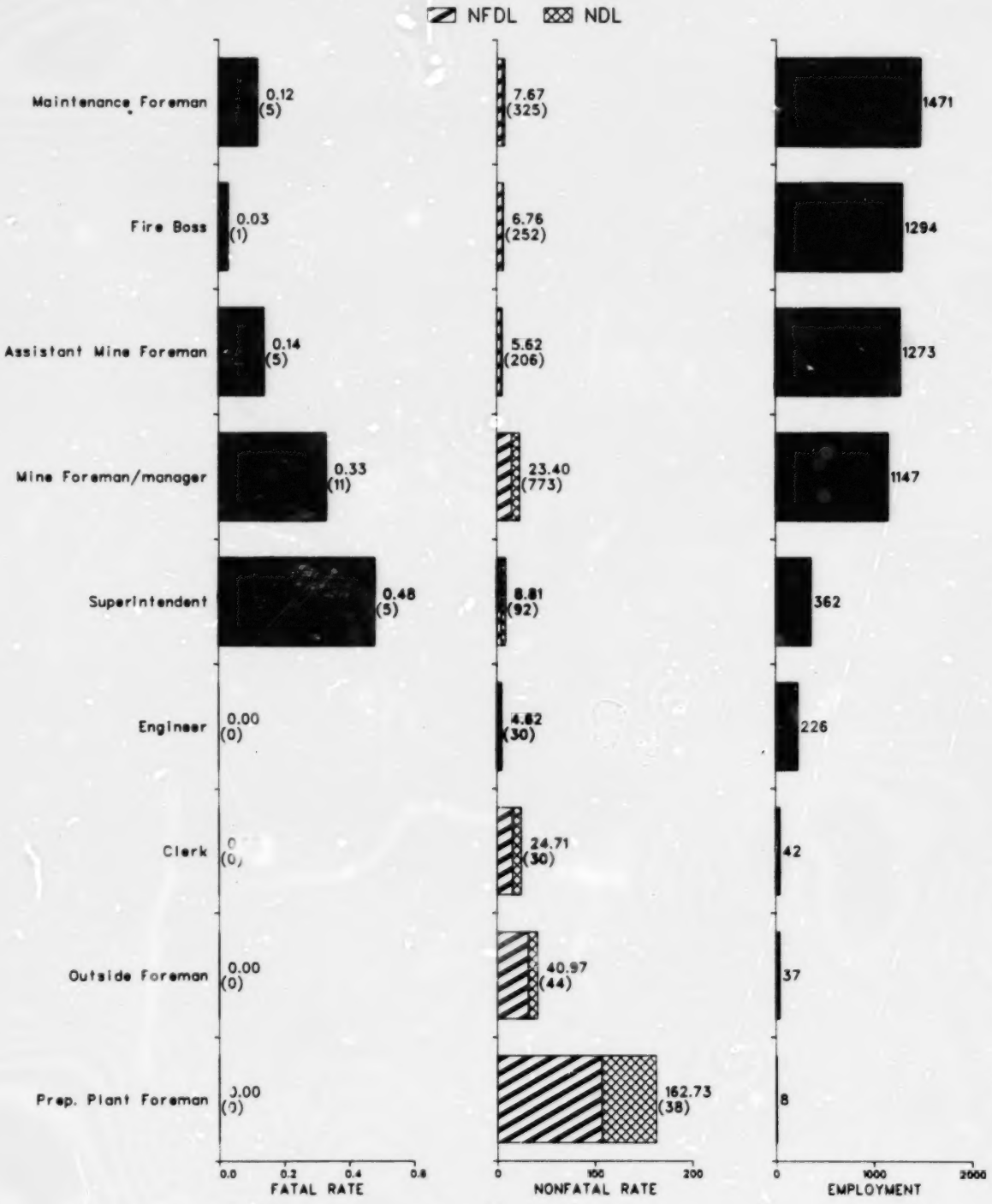

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FIGURE 31. - Injury-frequency rates and employment for coal supervisory and staff occupations, 1976.

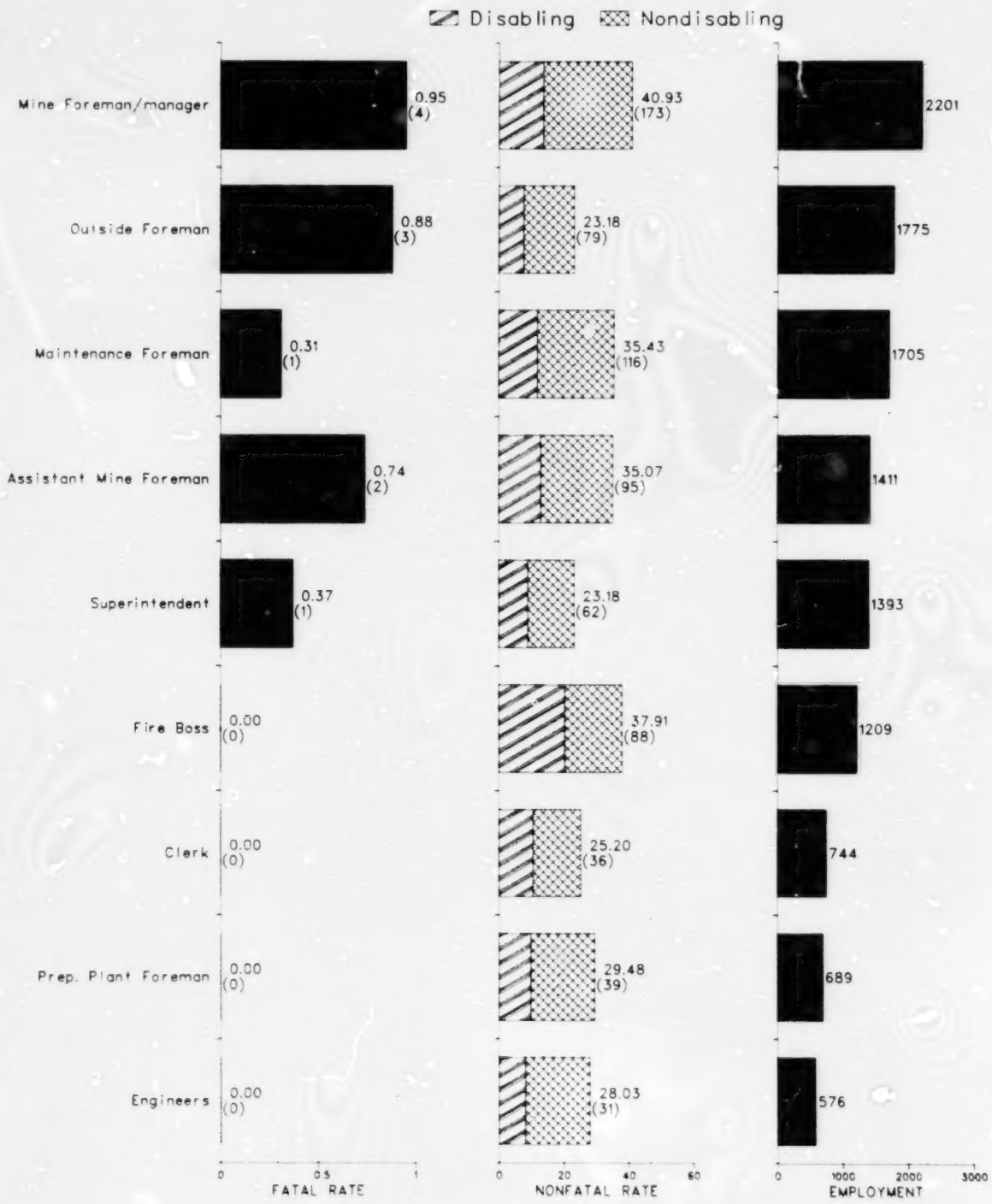

FIGURE 32. - Injury-frequency rates and employment for coal supervisory and staff occupations, 1977.

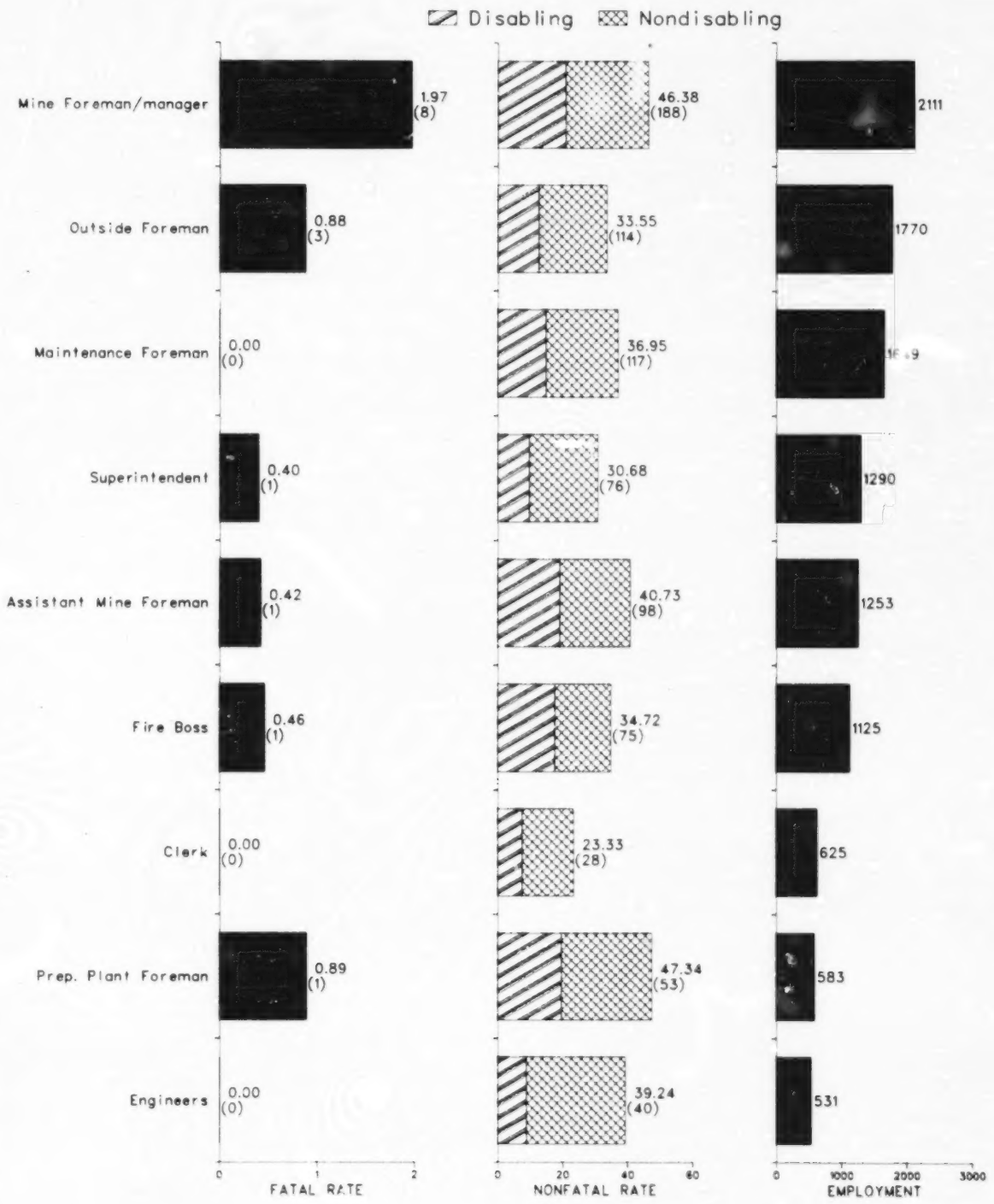

FIGURE 33. – Injury–incidence rates and employment for coal supervisory and staff occupations, 1978.

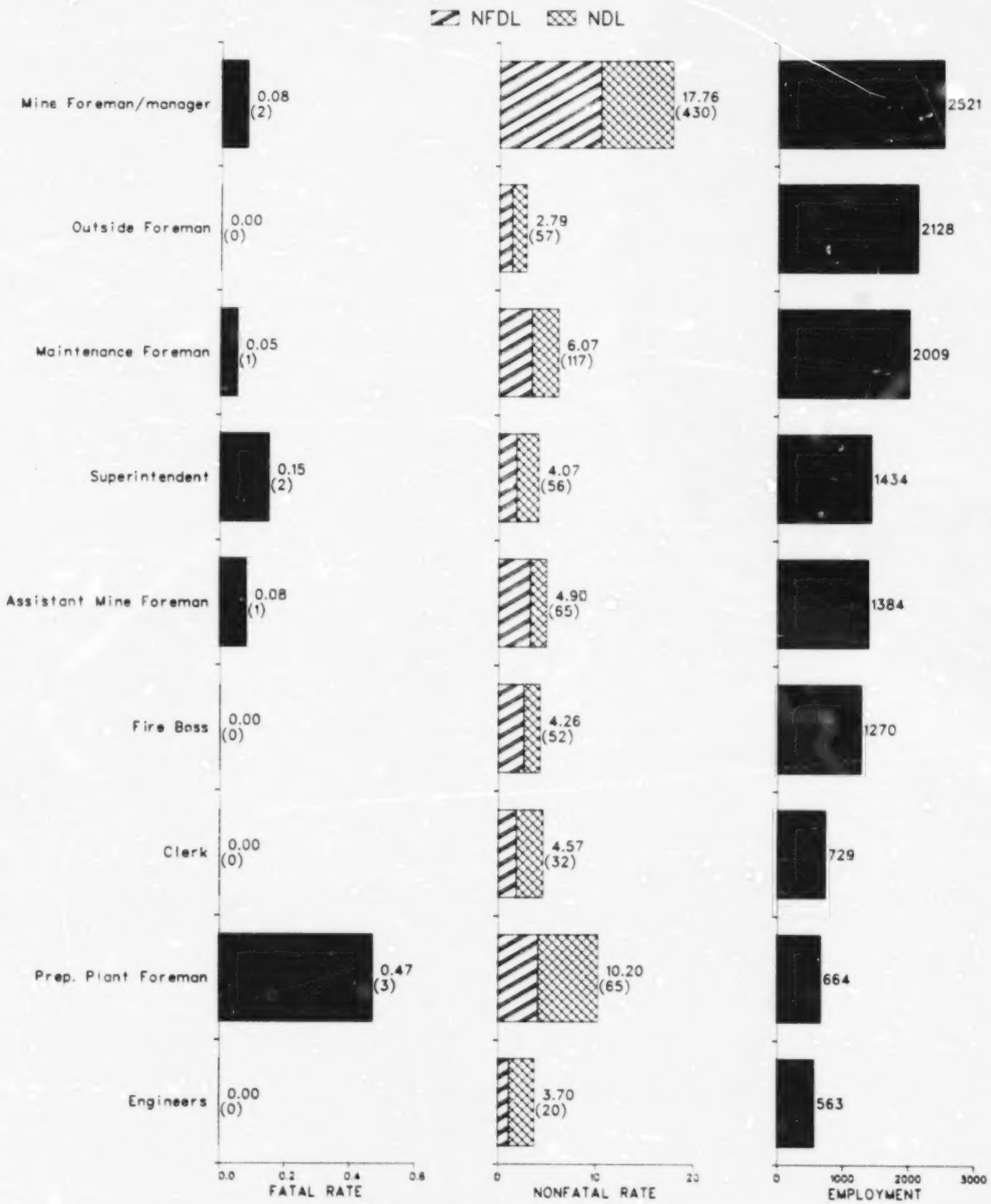

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FIGURE 34. - Injury-incidence rates and employment for Coal supervisory and staff occupations, 1979.

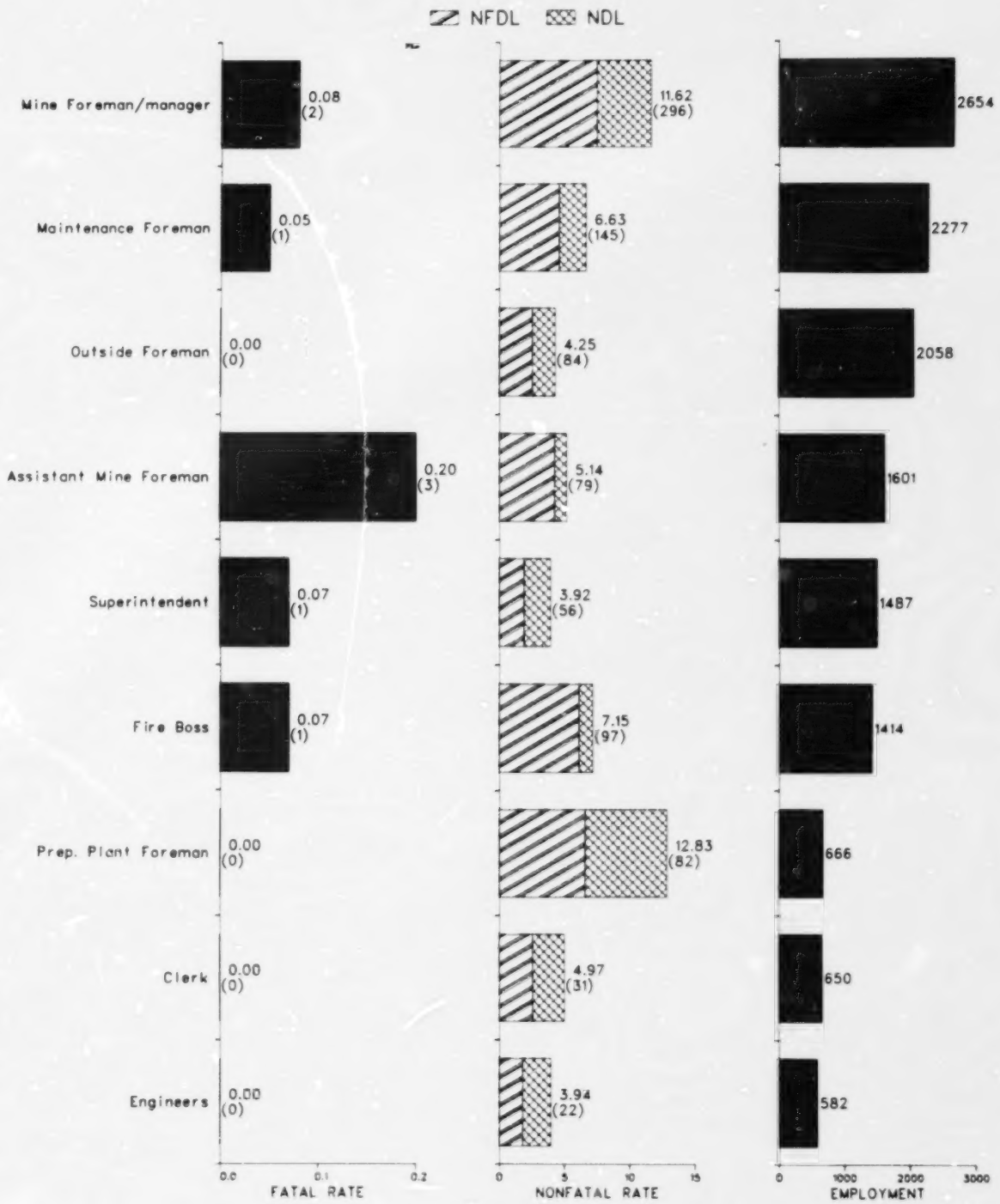

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FIGURE 35. – Injury–incidence rates and employment for coal supervisory and staff occupations, 1980.

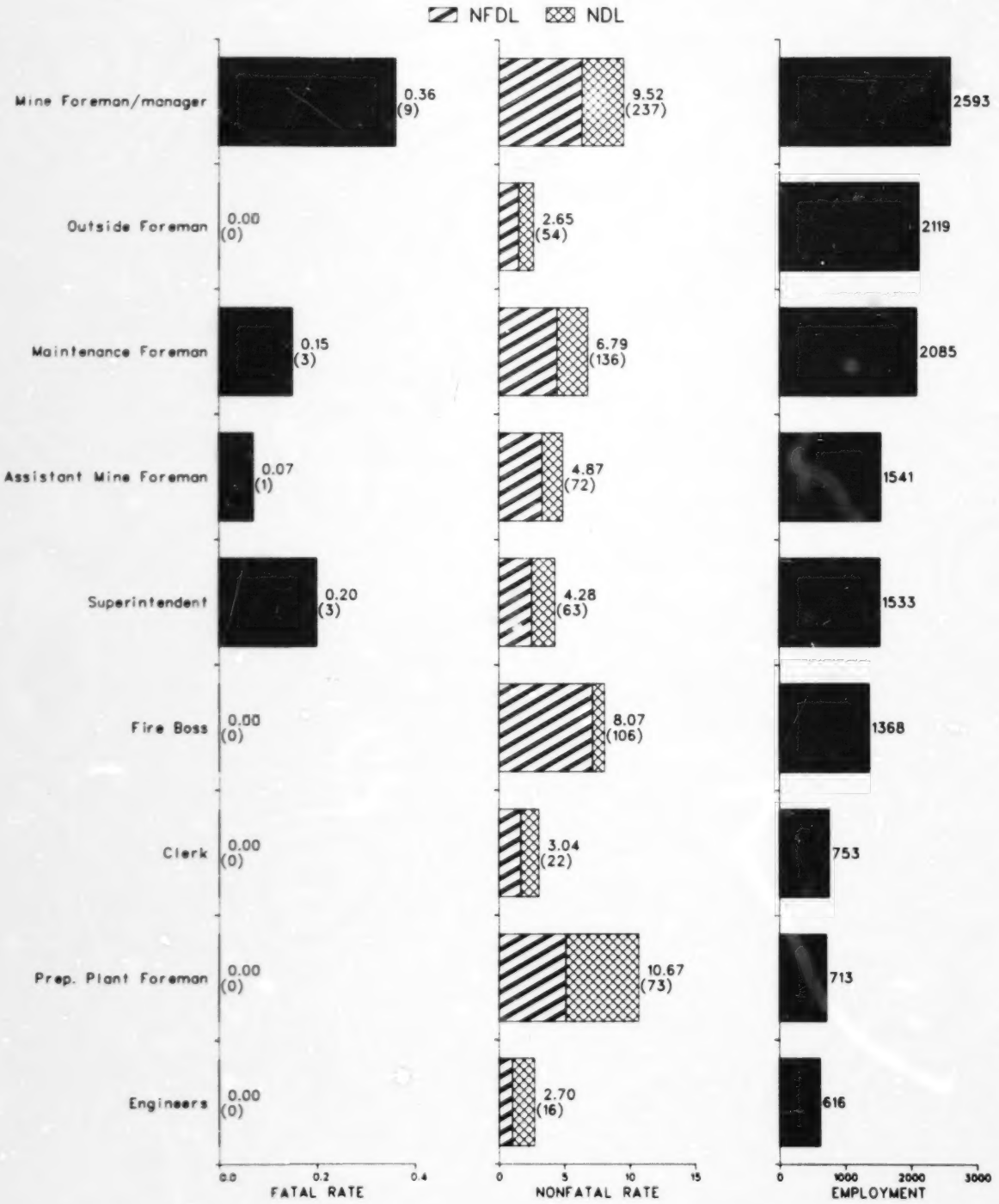


FIGURE 36.– Injury-frequency rates and average employment for coal supervisory and staff occupations, 1976–77.

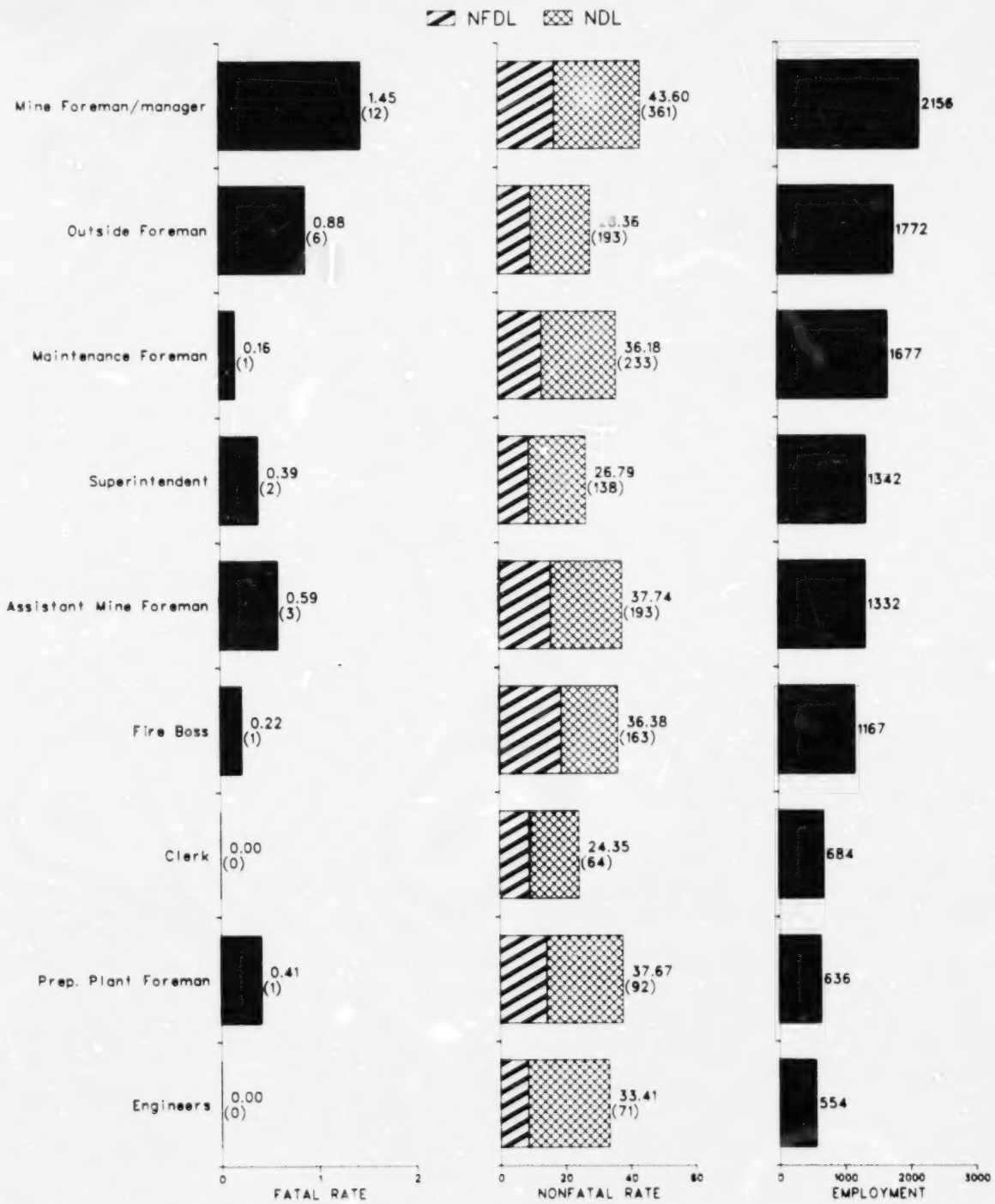


FIGURE 37.- Injury-frequency rates and average employment for coal supervisory and staff occupations, 1972-77.

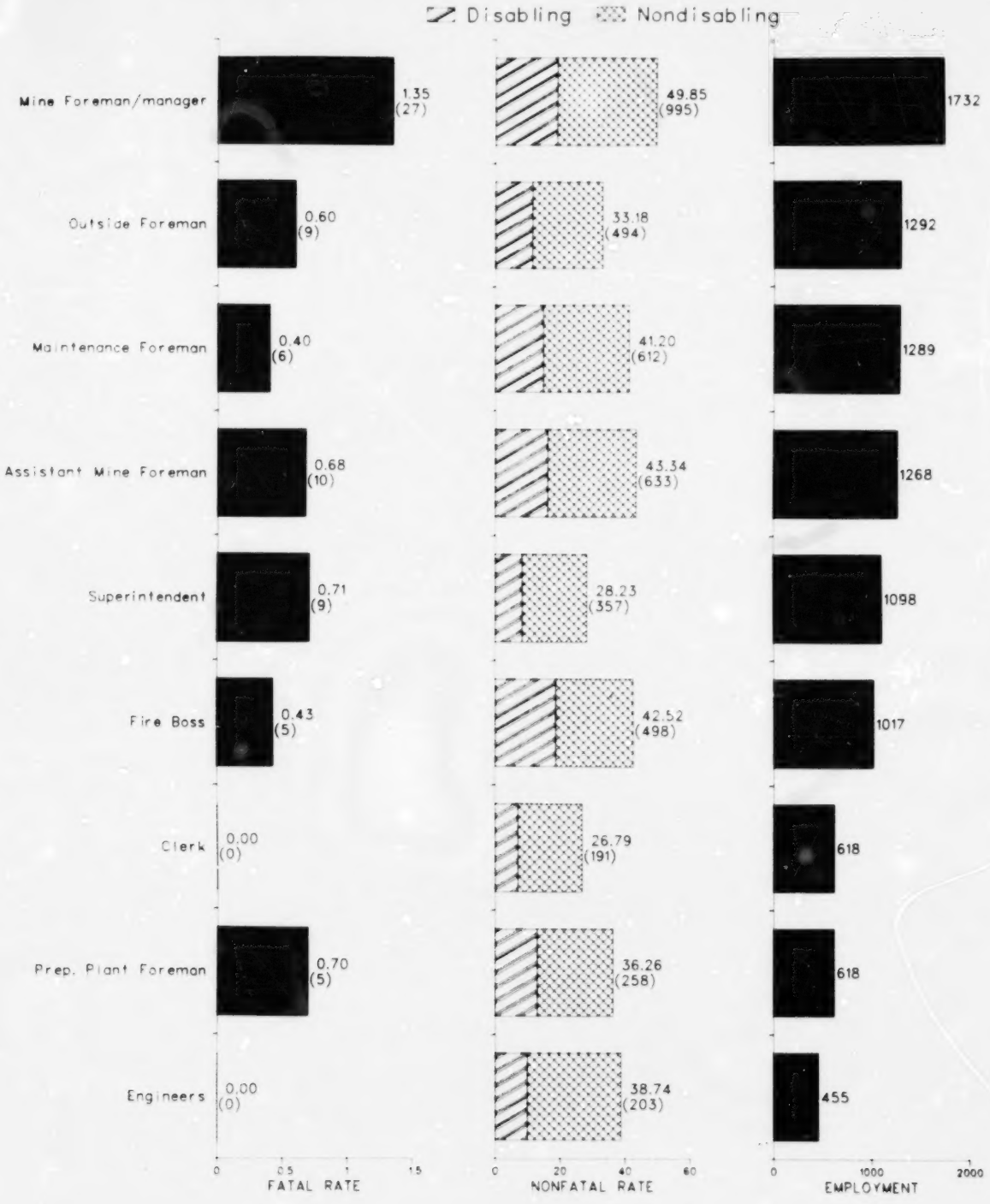
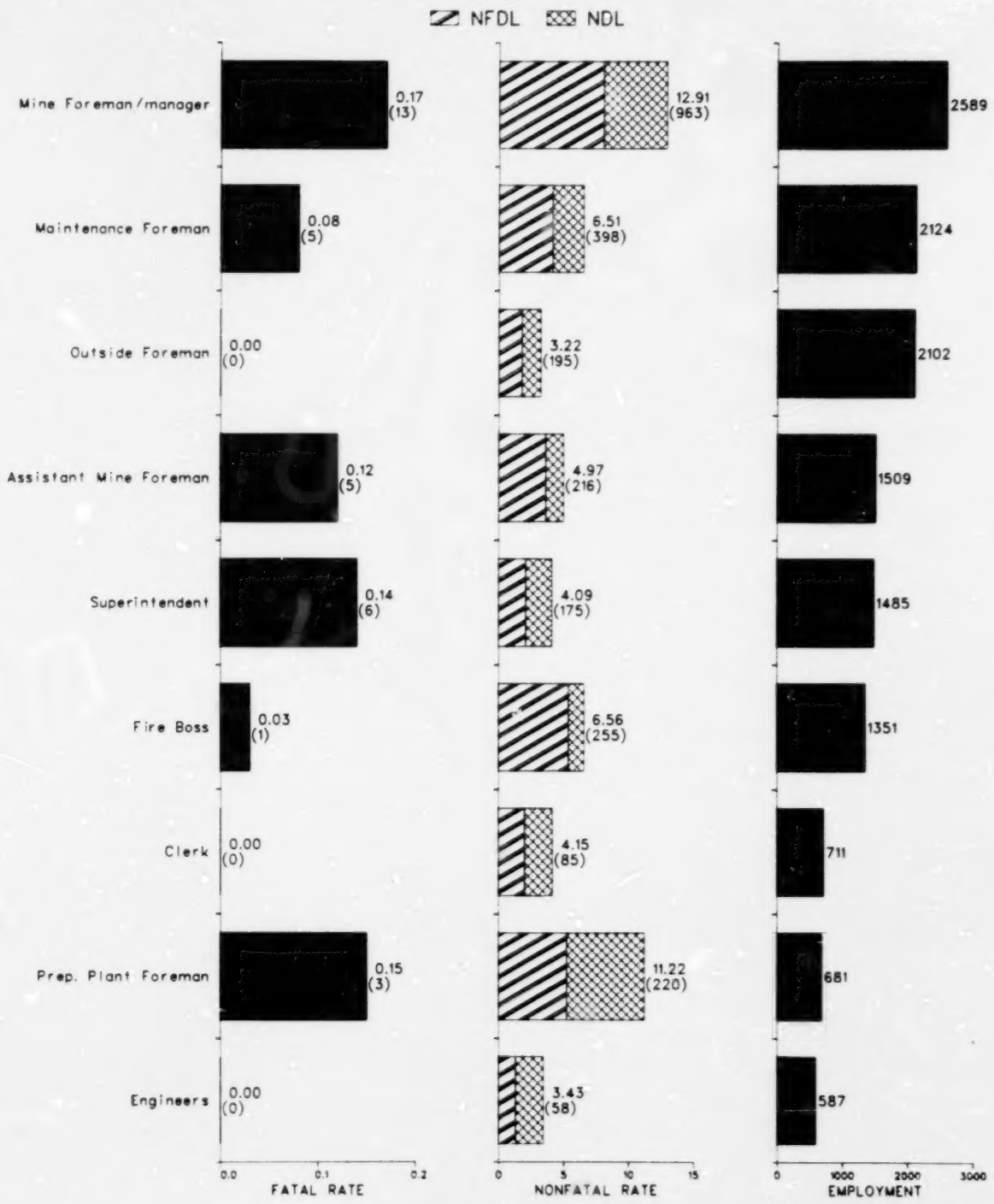


FIGURE 38.- Injury-incidence rates and average employment for coal supervisory and staff occupations, 1978-80.



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RANKING OF COAL MINE OCCUPATIONS ACCORDING TO RISK

Any hazard may persist over a considerable period of exposure before it actually causes an injury. If the number of workers in an occupational category is small, or if the time period on which the analysis is based is short, injuries that might have occurred if the exposure time had been just a bit greater cannot be observed. On the other hand, it is possible to observe just that time when a relatively unlikely injury happens to occur. In the "long run" (that is, when the period of study is very long and a great many workers are included) the injury rate observed for a particular occupation will reflect almost perfectly the true risk for that occupation. The injury and fatality rates for individual coal mining occupations are based, however, on what amounts to a "short run" of exposure time, even if they are calculated over the entire 9-year period of 1972-80.

The "true" or "underlying" injury (or fatality) risk of an occupation is defined to be the injury (or fatality) rate that would be observed if the observation could be made over an infinite amount of exposure time. We actually observe an injury rate over a finite exposure time, and we infer from it the extent of the underlying risk. The greater the exposure time (employee-hours) that goes into the observed rate, the more reliable is our estimate of the underlying risk. A rate based on just a few million employee-hours of exposure gives a more ambiguous picture of the true risk than a rate based on a great deal of exposure. Therefore, the rate calculated for a relatively uncommon occupation, such as scoop car operator, is less reliable than the rate calculated for a more common occupation such as shuttle car operator.

One way of depicting the reliability of a risk estimate is to plot an interval within which the true risk is almost certain to be. The reliability of the estimate, then, is reflected by the breadth of the interval: the more reliable the estimate, the narrower the interval.

Figures 39-44 depict 90 percent probability intervals for the risk of the 26 most hazardous coal mining occupations, with respect to fatalities, nonfatal disabling injuries, and all injuries for the periods 1972-77 and 1976-77. Figures 45-47 show risk of fatal injury, risk of NFDL injury, and risk of injury for these occupations in 1978-80. Figures 48 and 49 show risk of fatal injury and risk of injury for 26 most hazardous coal mining occupations, 1972-80. The solid vertical line in each figure represents the composite rate for the occupation shown.3/ For each occupation shown, the odds are 9 to 1 that an injury or fatality rate based on unlimited exposure time would fall somewhere between the left and right end-points of the shaded area. The broader the shaded area, therefore, the less precise our knowledge of how great the underlying risk really is. If the rates had been based on a much

---

3/ Interval estimates for injury risk are obtained using an empirical Bayes methodology. The scale for the horizontal axis is incidents per 200,000 employee-hours of exposure. Mines are listed in order of their estimated risk, represented by an "x", rather than their calculated incidence rate, represented by a heavy dot. For detailed explanation of this method, see the HSAC report, "An Empirical Bayes Methodology for Accident Risk Estimation and Incidence Rate Comparison," by Jon Kogut.

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greater exposure than what was actually available, then the shaded areas would have been narrower, like vertical pins; we would have been able to "pinpoint" the risk more precisely.4/

When two intervals are so broad as to overlap, this indicates the exposure time is insufficient for concluding that one occupation is substantially more hazardous than the other--at least not with a great deal of certainty. Put another way, the observed difference in rates is not, in the case of an overlap, "statistically significant." Whenever there is no overlap, an observed difference in rates is statistically significant and can be interpreted as signifying a genuine difference in risk. We may conclude, taking an example from figure 39, that the risk of fatal injury during 1972-77 was greater for continuous miner operators and helpers than for underground belt conveyormen; but it would be risky (since the intervals overlap substantially) to conclude that the fatality risk for continuous miner operators and helpers was greater than that for underground laborers.

It must be emphasized that a statistically significant difference in the rates for two occupational categories does not strictly imply that there is anything intrinsically more hazardous about one occupation than the other. On the contrary, there may be demographic factors related to injury frequency which are also correlated with occupation. An occupation, for example, might experience a high injury rate if it happened to include an unusually high concentration of young, inexperienced workers. The injury rate, in such a case, could be high not because of any extreme hazard intrinsic to the occupation but instead because young, inexperienced workers tend to experience a relatively high rate of injury--regardless of occupation. Strictly speaking, the hazard inputed to a given occupation applies only to the occupation with its present makeup of workers.

When the overlap in the probability interval is slight, as in the case of continuous miner operators and helpers versus shuttle car operators in figure 39, we may still conclude that there is a genuine difference in risk, though with slightly less than 90 percent certainty. The degree of certainty sacrificed depends roughly on the proportion of each shaded area involved in the overlap.5/

4/ It should be noted that in IR 1065 (see footnote 2) 95-percent probability intervals were used. The change to 90-percent probability intervals was made to be in accord with other publications prepared by the Health and Safety Analysis Center.

It should also be noted that the scales used in figures depicting risk of injury in IR 1065 were based on one million employee-hours of exposure, whereas the figures used in the current publication are based on two hundred thousand employee-hours of exposure.

5/ For further information on how to compare risks when the probability intervals overlap, see the HSAC report cited in footnote 3.

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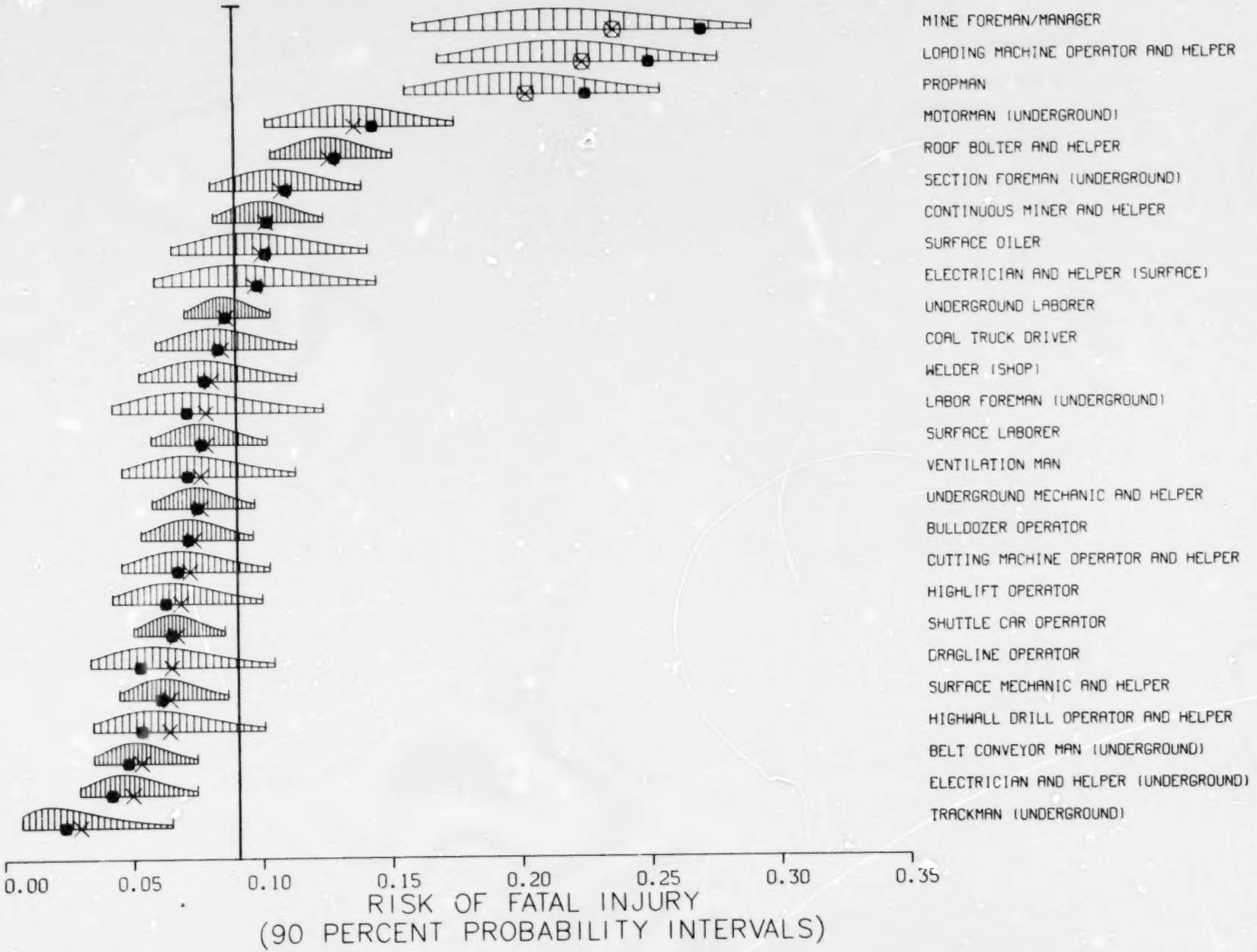

FIGURE 39. - Risk of fatal injury for selected coal occupations showing greatest employment, 1972-77

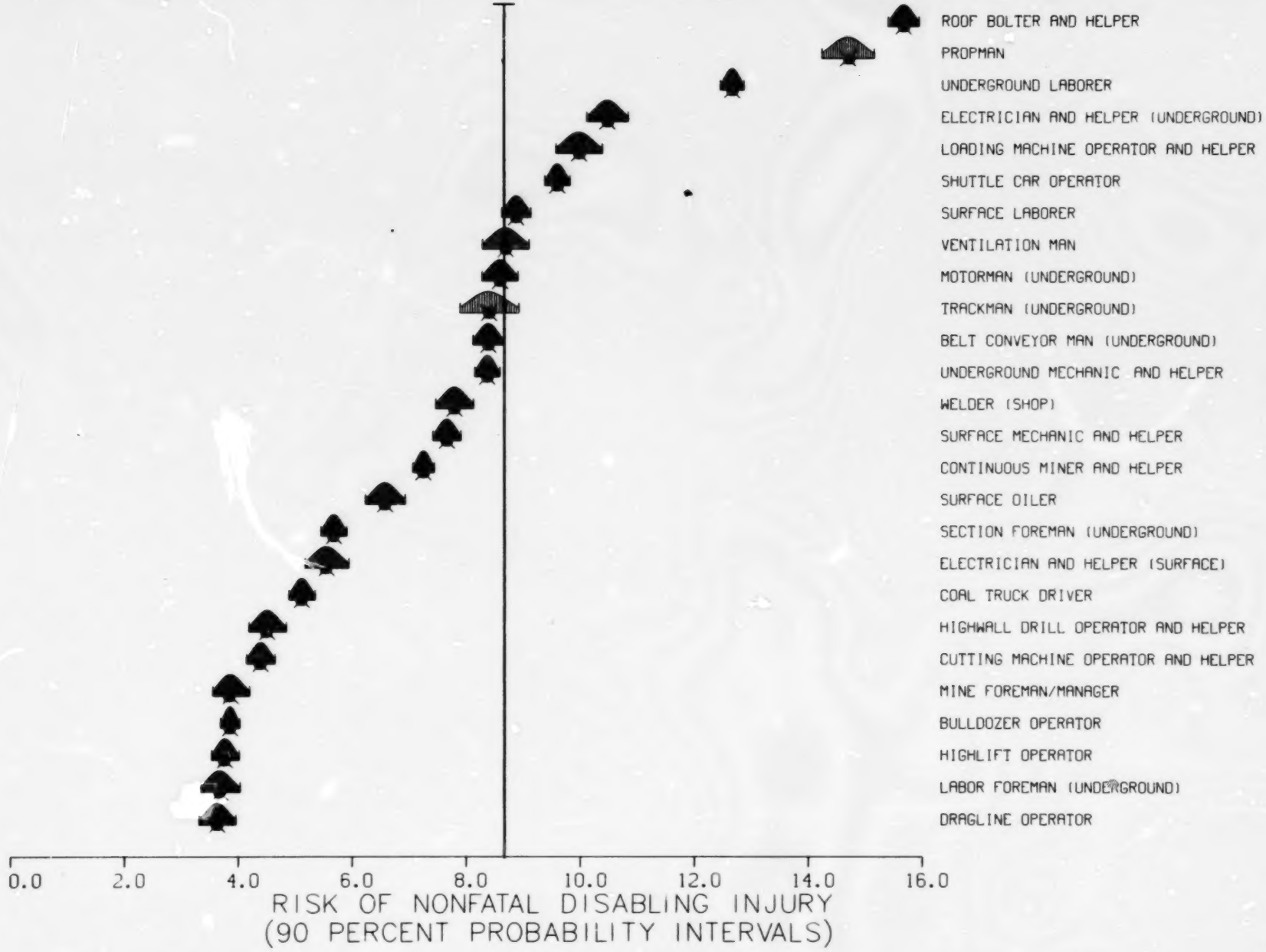

FIGURE 40. - Risk of nonfatal disabling injury for selected coal occupations showing greatest employment, 1972-77

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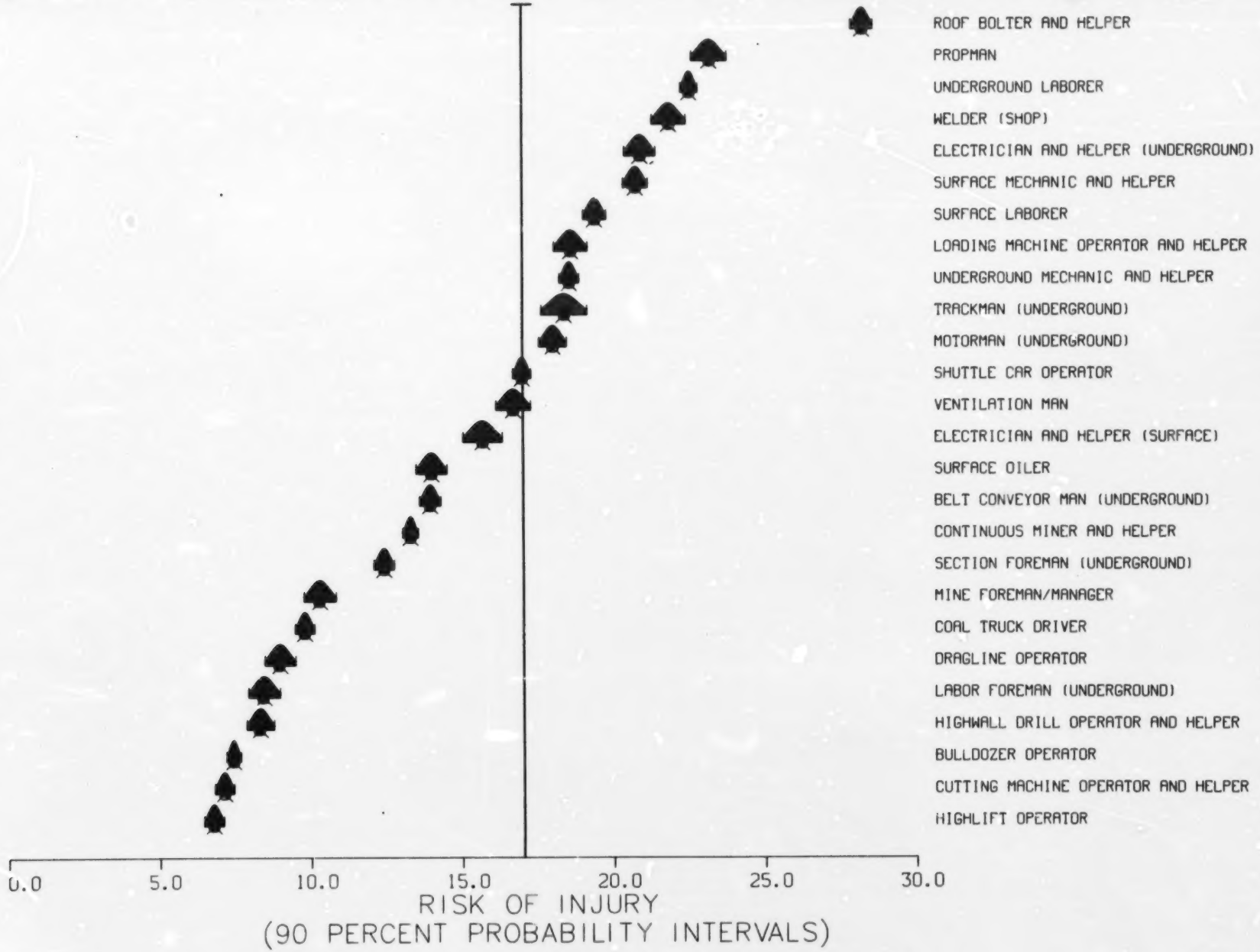

FIGURE 41. - Risk of injury for selected coal occupations showing greatest employment, 1972-77

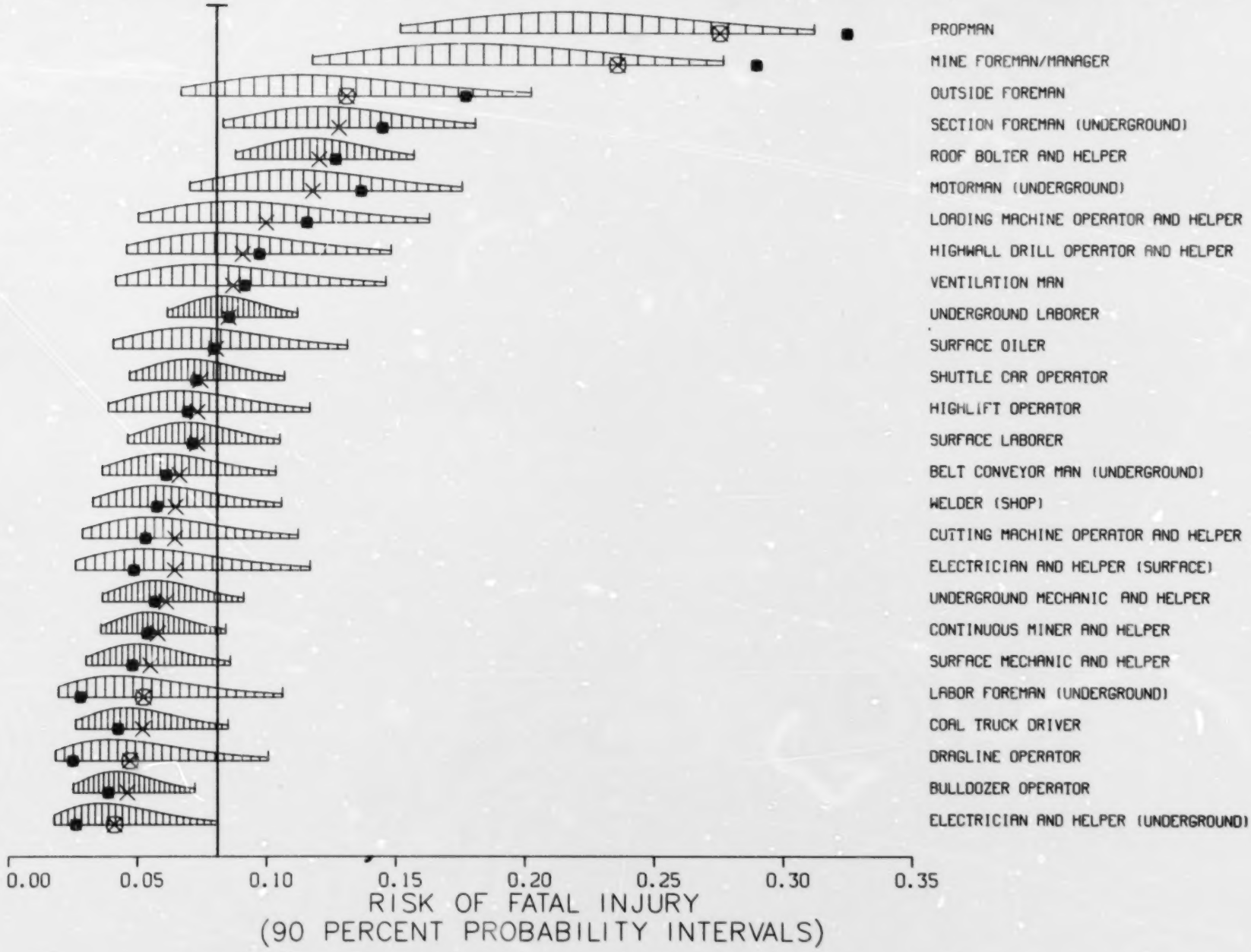

FIGURE 42. - Risk of fatal injury for selected coal occupations showing greatest employment, 1976-77

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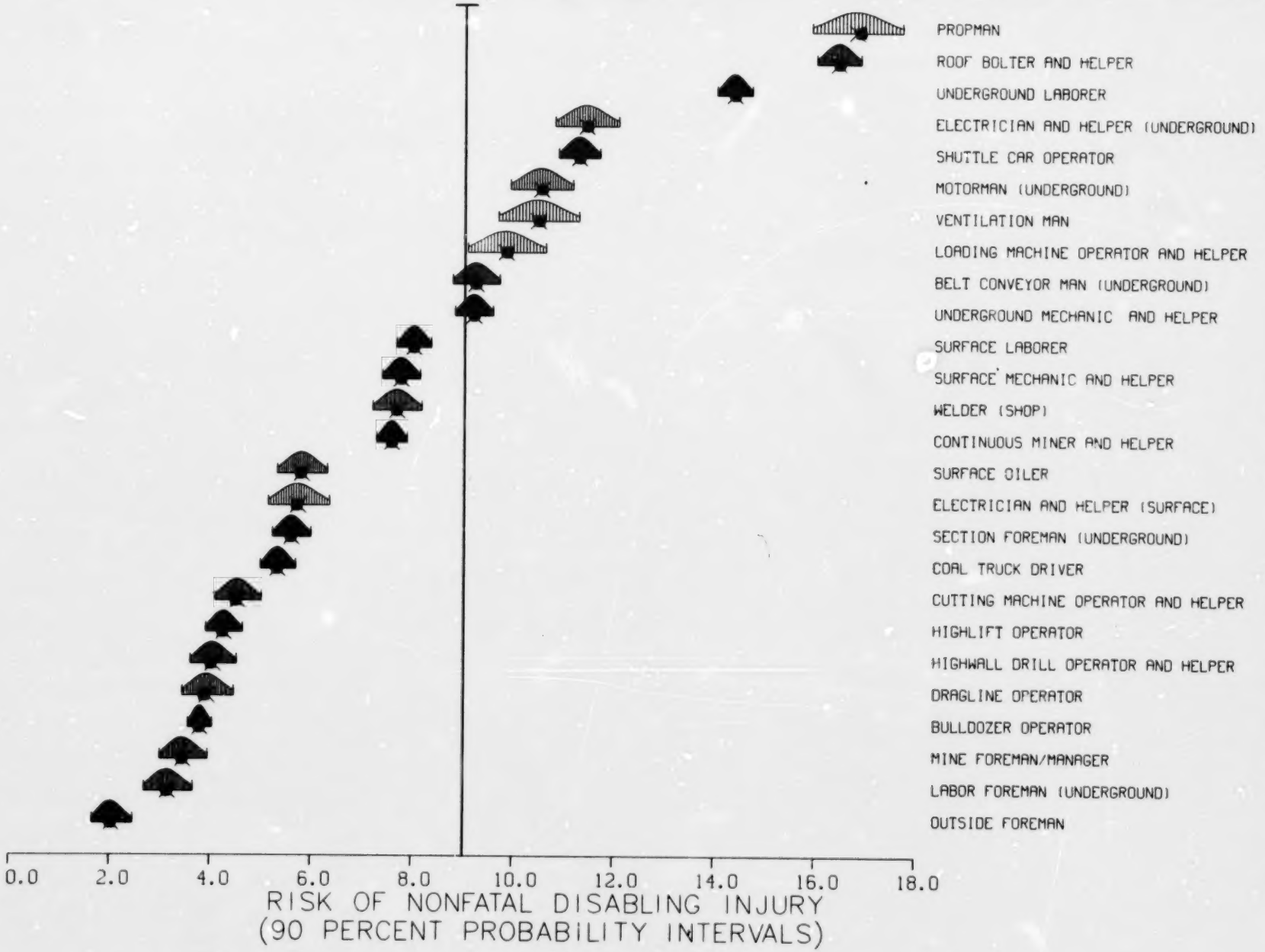

FIGURE 43. - Risk of nonfatal disabling injury for selected coal occupations showing greatest employment, 1976-77

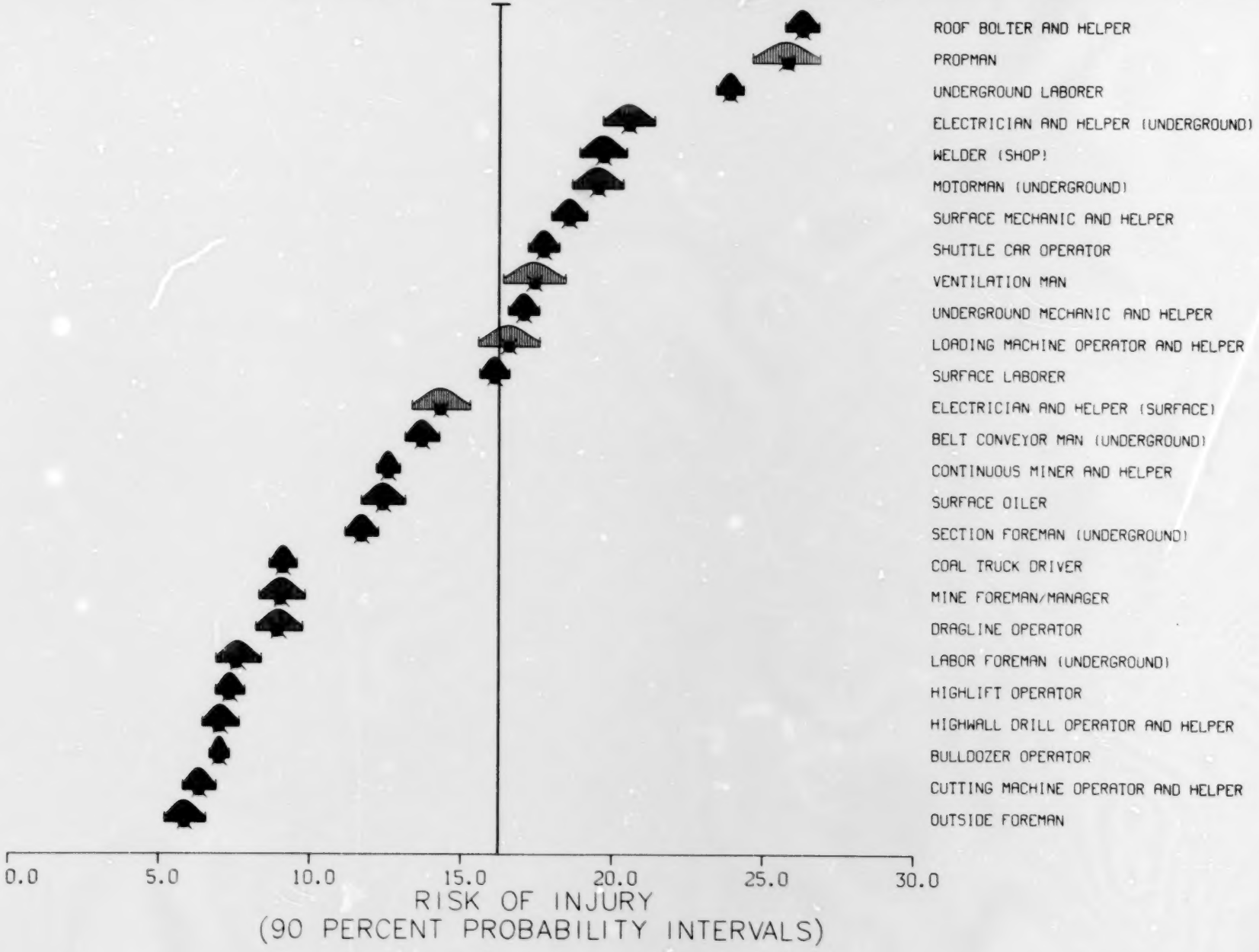

FIGURE 44. - Risk of injury for selected coal occupations showing greatest employment, 1976-77

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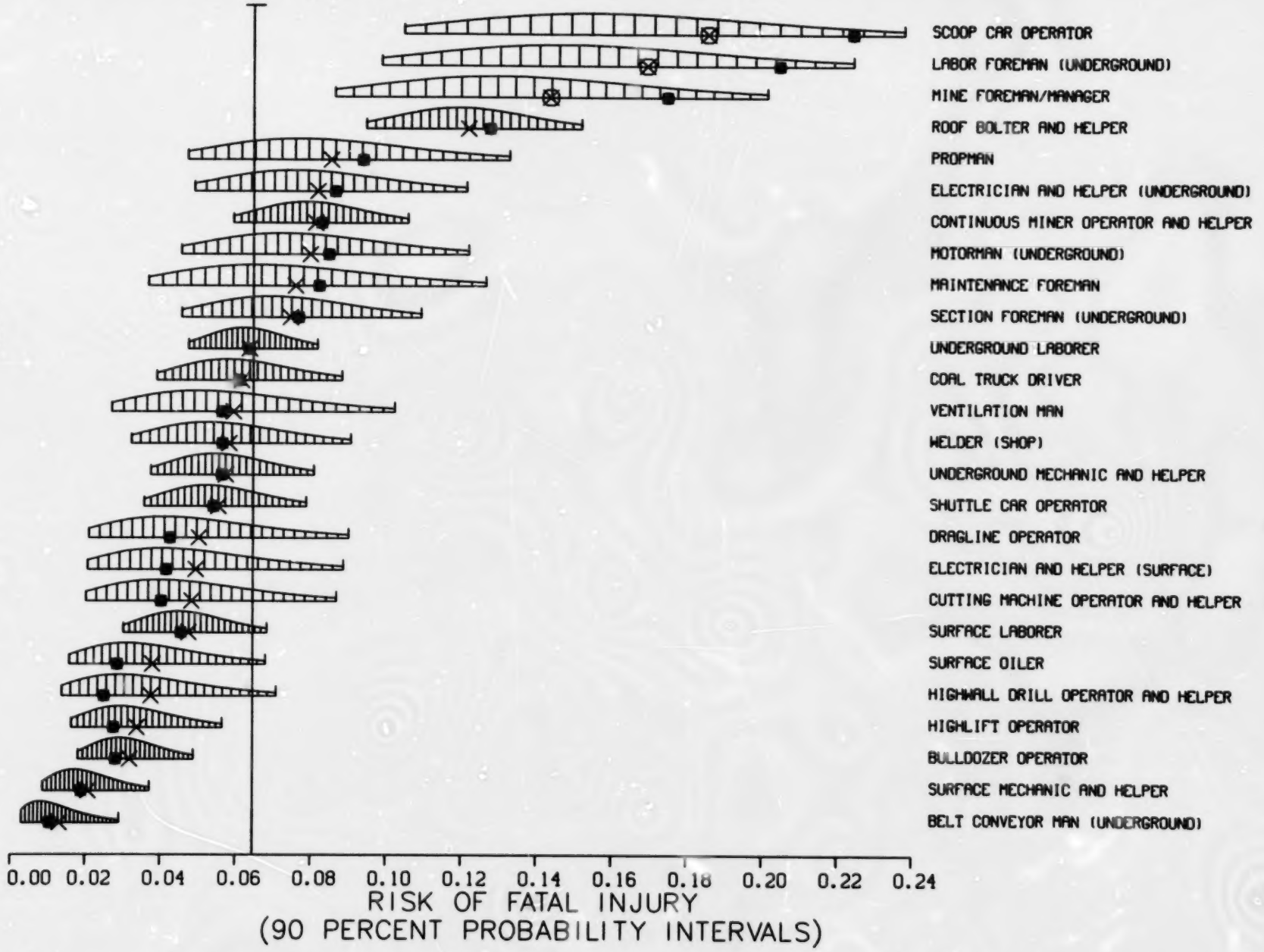

FIGURE 45. - Risk of fatal injury for selected coal occupations showing greatest employment, 1978-80

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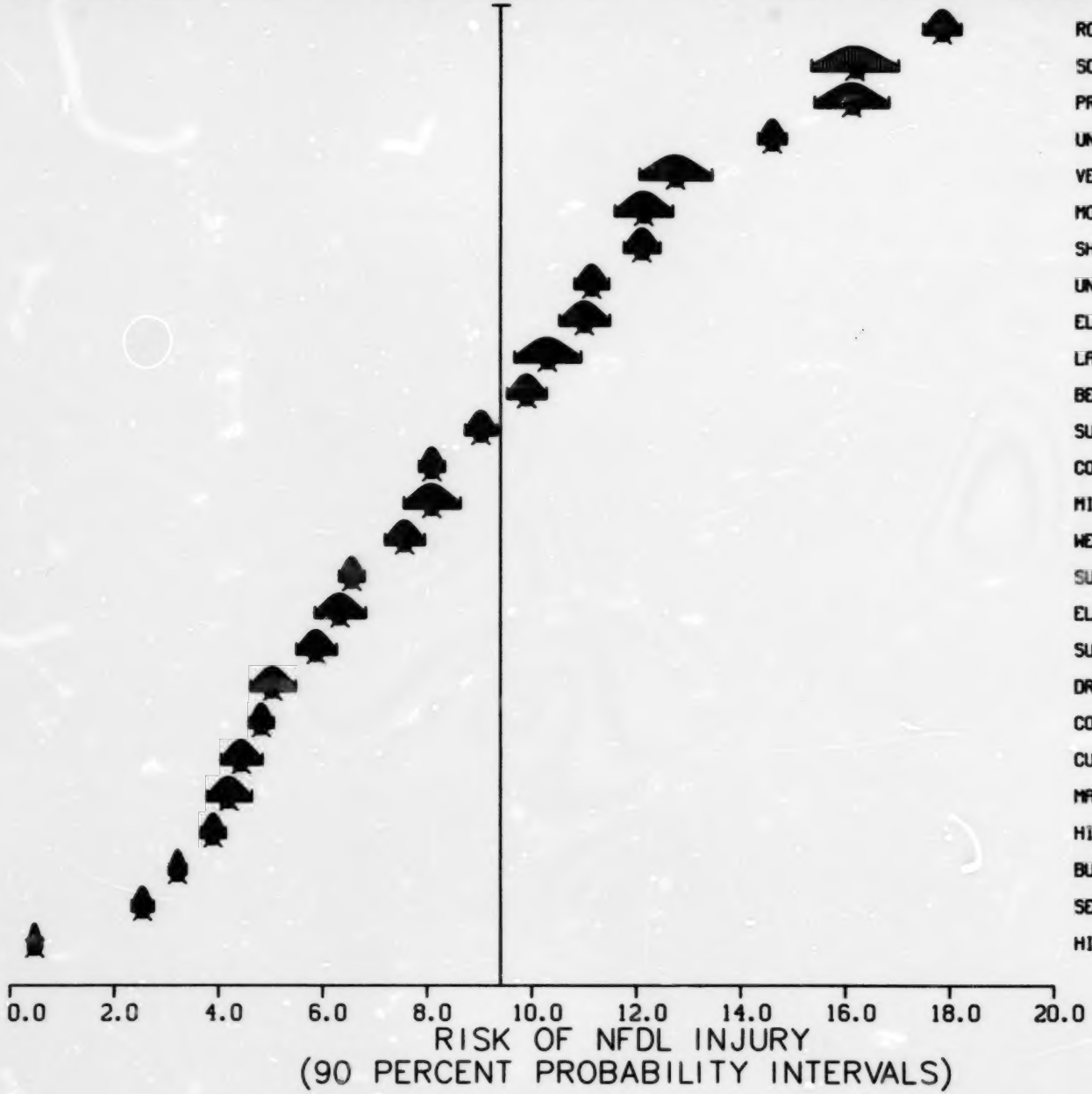

FIGURE 46. - Risk of NFDL injury for selected coal occupations showing greatest employment, 1978-80

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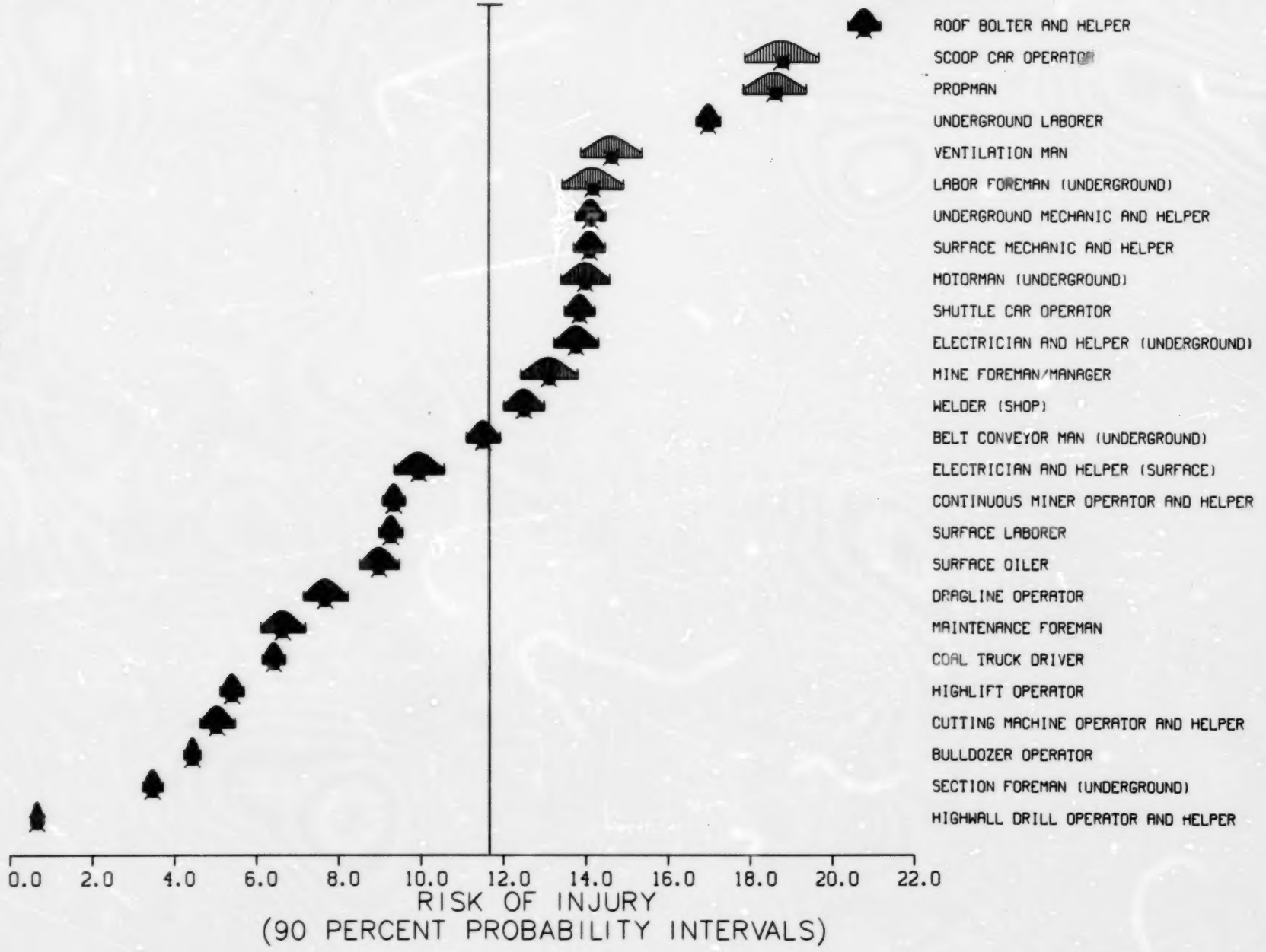

FIGURE 47. - Risk of injury for selected coal occupations showing greatest employment, 1978-80

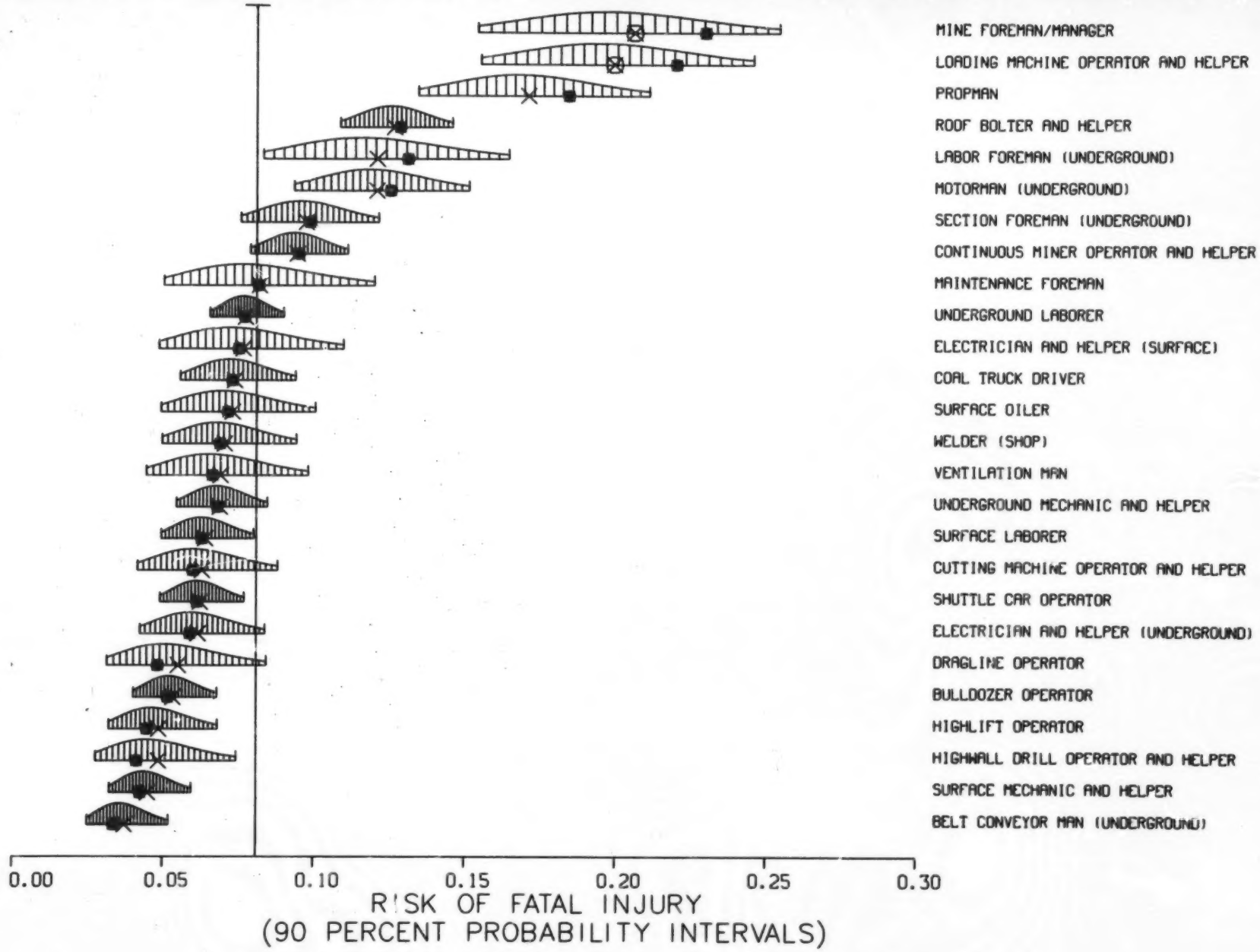

FIGURE 48. - Risk of fatal injury for selected coal occupations showing greatest employment, 1972-80

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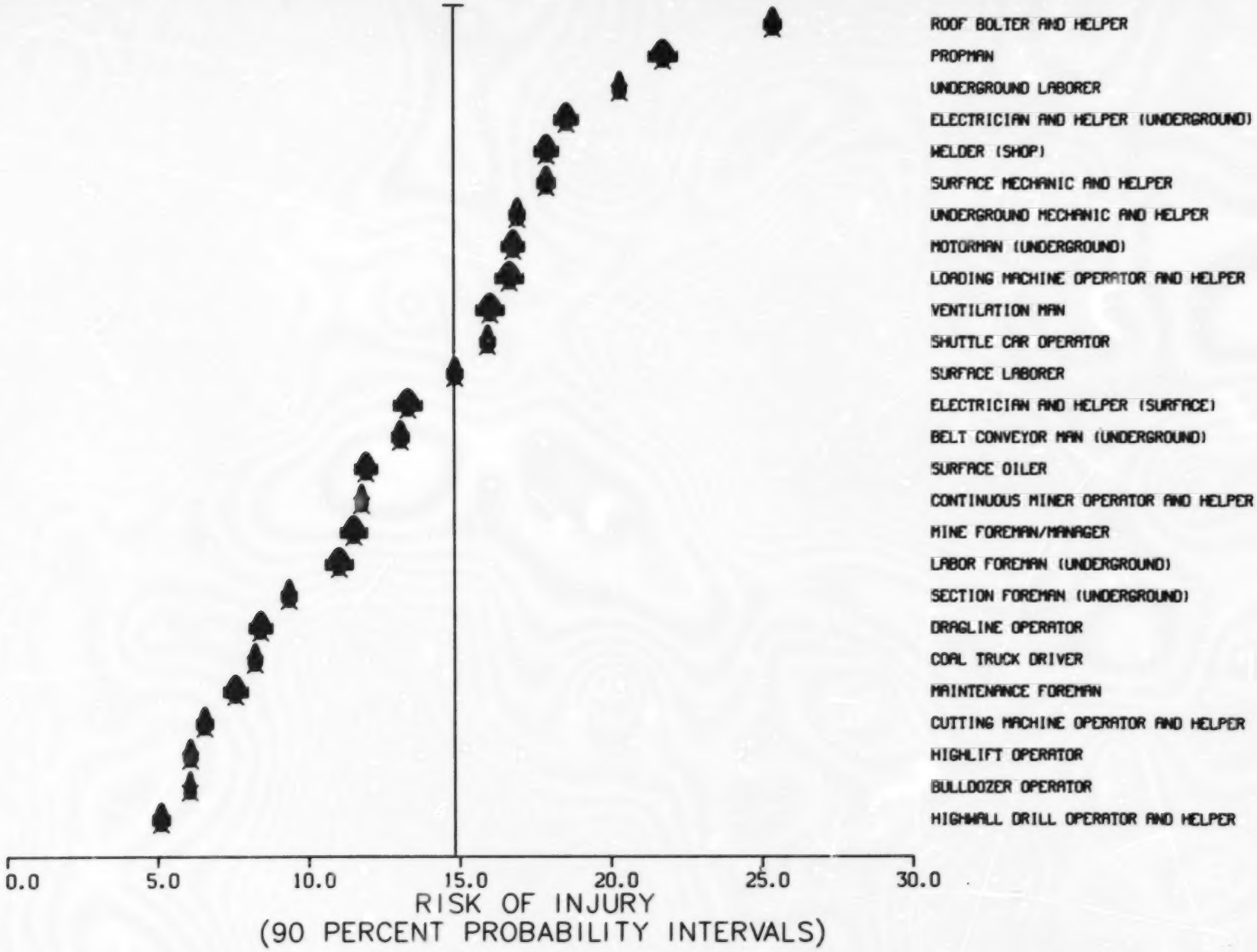

FIGURE 49. - Risk of injury for selected coal occupations showing greatest employment, 1972-80

APPENDIX--GROUPING OF OCCUPATIONAL CATEGORIES

Underground

Occupation code		Occupation code	
001	Belt conveyor man--Also includes	034	Coal drill operator
	154 Belt cleaner		033 Coal drill helper
	201 Belt/conveyor man		
		036	Cont. miner operator
002	Electrician		035 Cont. miner helper
	003 Electrician helper		
	011 Wireman	038	Cutting machine operator
	261 Battery station operator		037 Cutting machine helper
004	Mechanic	043	Loading machine operator
	005 Mechanic helper		042 Loading machine helper
			158 Rock machine operator
007	Blaster		
	031 Shotfire helper	046	Roof bolter
			047 Roof bolter helper
008	Ventilation man		048 Roof bolter (mounted)
	015 Fan attendant		
	032 Brattice man	050	Shuttle car operator
			250 Shuttle car operator
010	Propman		276 Driver
	041 Jack setter (longwall)		
	055 Jack setter (auger-returns)		
016	Laborer		
	013 Cleanup man		
	039 Hand loaders		
	045 Rockman		
	114 Coal dust sampler		
	277 Buggy pusher		

Surface

302	Electrician	316	Laborer
	303 Electrician helper		313 Cleanup man
	311 Wireman		314 Coal dust sampler
			366 Water boy
304	Mechanic		398 Groundman
	305 Mechanic helper		

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Surface--Continued

Occupation code		Occupation code	
309	Supply man	319	Welder (shop)
	385 Lampman		312 Belt vulcanizer
362	Brakeman	376	Coal truck driver
	373 Car dropper		386 Refuse truck driver
374	Cleaning plant operator		395 Water truck operator
	379 Dry operator	378	Dragline operator
	380 Fine coal plant operator		331 Clam operator
	388 Scalper-screen operator		387 Rotary bucket excavator
	390 Silo operator		
384	Highwall drill operator		
	383 Highwall drill helper		

Occupation categories not combined:

Underground		Surface	
Code	Occupation	Code	Occupation
006	Rock duster*	307	Blaster*
009	Supply man*	315	Fan attendant
044	Sheer operator/plow operator	318	Oiler*
049	Section foreman*	320	Cage attendant/cager
053	Utility man*	322	Coal dump operator
054	Scoop car operator*	350	Shuttle car operator
118	Oiler	356	Rock driller
122	Coal dump operator	360	Shopman
149	Labor foreman*	365	Dispatcher
156	Rock driller	367	Coal shovel operator
157	Pumper*	368	Bulldozer operator*
159	Water line man	372	Barge attendant
160	Shopman	375	Road grader operator
216	Trackman*	382	Highlift operator*
220	Cager	391	Stripping shovel operator*
221	Hoistman	392	Tipple operator*
240	Rosco operator	393	Weighman
262	Brakeman	396	Watchman
265	Dispatcher		
269	Motorman*		

* Denotes an occupation depicted in the bar graphs.

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Supervisory/Staff

Code	Occupation	Code	Occupation
402	Master electrician	481	Superintendent*
404	Master mechanic	489	Outside foreman*
414	Coal dust sampler	494	Prep plant foreman*
418	Maintenance foreman*	495	Safety director
423	Surveyor	497	Clerk*
430	Assistant mine foreman*	590	Education specialist
449	Mine foreman/manager*	591	Industrial safety
456	Engineer	592	Mine safety instructor
462	Fire boss*	593	Safety representative
464	Inspector	594	Training specialist

* Denotes an occupation depicted in the bar graphs.

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